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The American Journal of Roentgenology

Edited by P. M. Hickey, M. D.
Associate Editor, F. C. Zapffe, M. D.

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THE AMERICAN JOURNAL OF ROENTGENOLOGY

Editor, P. M. Hickey, M. D., Detroit
Associate Editor, F. C. Zapffe, M. D., Chicago

VOL. II JANUARY, 1915 No. 3

ROENTGEN DIAGNOSIS OF LESIONS OF VERMIFORM APPENDIX

By H. M. IMBODEN, M. D., New York City

Appendix convoluted—adherent to cecum and ileum. There was a marked ileostasis associated with this case.

The diagnosis of chronic appendicitis is still a matter for some discussion. It is not always verified at operation, nor does the subsequent history of the patient indicate a relief of symptoms. The trouble seems to be that the diagnosis is made and the condition does not exist. Codman, in a series of ninety-eight cases in which a diagnosis of chronic appendicitis was made, reports finding twenty-four normal appendices at operation. The appendix has been frequently removed when the real cause of the trouble was stone in the genito-urinary tract, especially in the lower right ureter, tuberculosis-peritonitis, tubercular mesenteric glands, painful right inguinal hernia, pleurisy, etc.

It is evident, therefore, that any addition that can be made to our knowledge of this common diagnosis should be very welcome.

P. P.—Distention of the proximal portion with probable obstruction of the distal portion.

No. 1.—Appendix occupying supposedly normal position. Note the gradual tapering of the cecum into the appendix.

No. 3.—Appendix whose direction is apparently transverse in the abdomen. The stereoscope shows the terminal portion to be directing backwards. Eleven days after this examination the patient was operated on at which time barium sulphate was still found in the appendix.

No. 2.—Appendix—observation made 48 hours p. c. Note especially the segmentation.

No. 4.—Appendix which the stereoscope shows to be turned backwards.

No. 5.—Appendix in which the tip is found adherent to the cecum. Note the queer position. Tenderness over the base of the appendix.

In certain cases the Roentgen meal examination yields valuable information. Acute appendicitis does not require our attention, but Case suggests when there is left-sided pain an opaque enema carefully administered may reveal a left-sided cecum and appendix.

Interest in the Roentgen diagnosis of appendicial diseases was stimulated by the investigation of intestinal stasis. The appendix had been observed very occasionally before this time, but not until the horizontal position of the patient became routine in the study of the ileocecal region was it possible to make a careful and detailed study of the appendix. For the purpose of this examination the horizontal position of the patient with the diaphragmed tube under the table, the fluoroscopic screen on the abdomen, and some means of palpation, are most essential. For palpation, the hand, either gloved or bare, and the Holzknecht spoon, are used. I prefer using the gloved hand and a four inch gauze bandage. The advantages claimed are non-obstruction of the field and decided ease of manipulation. The vertical and Trendelenberg positions should also be used. The vertical position is especially useful if the appendix is hitched up to some fixed point. It emphasizes the kink and degree of fixation. It also reveals the drag which is caused by the downward pull of the cecum. The Trendelenberg position offers a decided advantage in those cases in which the cecum may be so placed in the pelvis as to lead one to the opinion that it is permanently anchored. By means of the Trendelenberg position the unanchored cecum may be more easily dislodged and its true condition revealed, while the retrocecal appendix may be more easily brought to light. The relation of the sigmoid to the cecum and appendix is more easily studied in this position.

A tilting table is necessary to secure the Trendelenberg position. Various types are in use. Dr. Caldwell has just built one by which the vertical, horizontal, and Trendelenberg positions may be easily secured. A full description of the same will shortly be published.

The making of the Roentgenogram is sometimes difficult, the field being obstructed

No. 6.—Appendix in which the tip is adherent to the cecum. No tenderness over the appendix. There was a retention of the barium in the cecum and appendix for several days after vigorous catharsis.

No. 7.—Appendix adherent to the outer side of the cecum and under surface of the gall bladder. The patient's symptoms were entirely those of gall bladder disease.

No. 9.—Appendix which was very tender on palpation. Fixed in its position. At operation was found adherent to the under surface of the liver. The patient's symptoms were never assigned to the appendix. Since appendectomy patient has been free from all symptoms.

No. 8.—This appendix is unassociated with tenderness or interference of drainage.

No. 10.—Chief symptoms in this case were colitis with tenderness over the entire colon. The appendix was not suspected as a cause. Roentgen examination showed a marked tenderness over the course of the appendix.

No. 11.—The appendix in this case was not visualized until the cecum was more or less empty. Stereoscope then picks it out very clearly.

No. 12

Nos. 12 and 13.—These are the same case. Observation in No. 12 made six hours p. c. Observation in No. 13 made forty-eight hours p. c. Notice difference in position and filling of the appendix.

by the opaque material-filled cecum or ileum. These organs must be held out of the way. For this purpose the bandage or Holzknecht spoon are useful. Stereo-roentgenography is useful, especially so when the appendix lies very close to the cecum or ileum. Its true direction is more easily estimated, kinks are demonstrable and other valuable information gained.

Pathologists inform us the effects of previous inflammation of the appendix are shown by

1. Peritoneal adhesions.
2. Obliteration of the whole or portions of its lumen.
3. Strictures of the lumen, with more or less dilatation distal to it.
4. The presence of hard concretions, which are retained by strictures, or produce the same effects as strictures.

Concretions may be demonstrated occasionally. The remaining three of these pathological conditions may be inferred from the following information gained by the examination:

No. 13

No. 14.—Letter "P" indicates the tender spot. The barium remained in that position for a number of days after the meal. At operation some of the barium was still found in the appendix.

1. Drainage.
2. Position and direction.
3. Kinks and obliteration.
4. Size, including length and calibre.
5. Mobility.
6. Location and relations of points of tenderness to the viscera.

The mere presence of some of the opaque meal in the appendix is no indication of chronic disease. Moro demonstrated beautifully, by his cinematographic studies of the intestines of the dog, that the appendix vermiformis partakes of the same peristaltic action as the cecum. Cohen says that cecal contents enter normally into the appendix. It should be empty, however, when the cecum is empty if not before. Cohen says it may fill and empty several times during the same opaque meal. The probable reason the normal appendix is not always visualized is that it fills and empties between observations. Failure in filling may also be ascribed to:

1. Obliteration of its lumen.
2. Adhesions or kinks near the proximal end.
3. An acute attack with infiltration of the mucosa.
4. The lumen may be obstructed by an enterolith or filled with contents not bearing an opaque material.
5. Its position may be unfavorable for Roentgenoscopy, that is, it may be retrocecal, in which event if the cecum is partially empty the stereoroentgenogram usually reveals it.

Delay in emptying of the appendix indicates interference with drainage and must always be regarded with suspicion, especially so if the delay extends

1. Over a period of some twenty-four hours after the cecum is normally empty.
2. If it is still filled, or contains any opaque material, after vigorous catharsis.
3. And especially so if the visualized appendix, in which there is delay in the emptying time, is associated with a distinct area of tenderness.

Even though the appendix is not visualized, the fact that we are able to study closely the suspected region and definitely determine whether or not a given area is, or

No. 15.—Appendix which retained its barium after catharsis.

No. 16.—Notice the peculiar turn of the appendix. Could not be changed by manipulation and at operation was found to be fixed.

is not, associated with the appendix, gives us very important information. This so-called indirect method of examination is very much advocated by some men, especially by those who rely exclusively upon the opaque enema. Relatively few appendices are visualized by this method in comparison to the opaque meal method.

The position of the appendix can usually be definitely determined. In order to be certain about this, two or more examinations should be made in which the findings are similar. I have frequently seen the appendix occupying different positions at intervals. The position is dependent upon a large number of conditions, in either one of which it is possible to have a chronic appendix, but chronic disease is not dependent upon position. However, the positions in which chronic disease have been most frequently found are:

1. "Posterior and external to the cecum, with the distal end of the appendix directed upward and meeting within the peritoneum.
2. Posterior and external to the cecum, and without the peritoneal cavity.
3. Directly behind the cecum, often just behind the ileocolic valve."

The question of fixation and mobility may be largely determined by palpation. The size, that is calibre and length, depend upon the freedom of the lumen from obstructions, strictures, infiltrations, and is readily determined in all visualized appendices. The determination of the area of tenderness is one of the cardinal features of the examination. By this method of examination the tender area may be definitely fixed. Whether it is associated with the appendicial area can be determined with a greater degree of accuracy than by any other known method of examination. Seeing palpation is more preferable than palpation without seeing.

Conclusions:

1. Retention of appendicial contents after the cecum is empty should be regarded as suggestive of chronic appendicitis.

2. A tender area located in the course of the appendix must always be regarded as very suspicious.

3. The Trendelenberg position affords an opportunity to study this area unapproached by any other.

4. Stereo-roentgenography affords the increased amount of information usual to this method in general.

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G. T. Monod. Vol. XLII—1580, J. A. M. A. and Demonstration N. Y. Academy of Medicine—A Study of the Movements of the Intestines Under Artificial Stimulation.

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E. A. Codman. Observations on a Series of 98 Consecutive Operations for Chronic Appendicitis. Medical Communications of the Mass. Med. Soc., Vol. LLIV, 1913.

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DISCUSSION ON DR. IMBODEN'S PAPER

DR. A. HOWARD PIRIE, Montreal: Dr. Imboden mentioned the fact that the barium remained in the appendix a long time. I would like to mention a case in which I watched the barium fill the appendix for three weeks, and then I had an opportunity again, forty-three days after the meal had been given, of looking at it, and the appendix was still filled. The lady in that case was suffering from gastric symptoms. The appendix was not referred to in any way. I said she ought to have an attack of appendicitis, and three weeks afterwards she had a real attack, with abscess formation. I do not know whether there was any coincidence between the fact of the barium being given and the attack of appendicitis. I hope not. I merely mention this as an isolated case.

DR. PAUL EISEN, Chicago: I think we have all had the same experience with the appendix. Personally, I consider the examination of the stomach in every case of appendicitis of the utmost importance. Very many patients are sent to us with the diagnosis of ulcer of the stomach, and if we look for it, we are very apt to find an actual inflammation of the appendix. In order to justify himself, however, the surgeon opens the stomach, but fails to find any ulcer. These are really cases of appendicitis, with a very large six-hour residue in the stomach. We have found it going away up to the fornix, but there was no ulcer in the stomach or duodenum. It was a plain case of appendicitis.

As to the matter of tenderness: in two cases having no tenderness and which we have followed to operation, there was a stricture at the distal end of the appendix, and distal to that there was pus, and the clinical evidence that there was appendicitis was correct. The lumen showed up to the stricture, but there was no tenderness, because the mesenteriolum does not go up to the tip of the appendix. One would make a big mistake to rule out appendicitis because there is no tenderness or because there is no distinct X-ray evidence of appendicitis. The clinician is right even if the roentgenologist is induced to give a negative report.

Another thing that taught me a lesson is to overestimate terminal ileal retention, without appendicial data. In two cases we made a diagnosis of probable appendicial involvement. By some mistake on the part of the nurse, both cases had received no food for 22-23 hours and were examined on the following day. The terminal loops of the ileum in both cases were filled. The surgeon opened one patient, and when the ileal loops were examined there were no kinks. The appendix was examined microscopically and was found to be normal.

DR. GEORGE E. PFAHLER, Philadelphia: I have been much interested in this study of the appendix, and have some evidence, but I am by no means clear as to the importance of the various pictures. There is one question in my mind, and that is: If this bismuth stayed in the appendix for such a length of time, why was the appendix not filled with fecal matter or food residue before the bismuth got into it? Why did not that stay and keep the bismuth out?

DR. D. R. BOWEN, Philadelphia: Dr. Pfahler just mentioned what was in my mind. I have a plate on exhibition which is interesting—a pin in the appendix. It was there for forty-two days, to my certain knowledge, and if I can accept the statement of the patient, it was there for several months, and during all that time there were no symptoms referable to the appendix. The patient was examined because she was known to have swallowed some pins, three or four at one time, and also because she had some pain in the *left* iliac fossa. When the appendix was removed, it was acutely inflamed, enlarged and deformed, but still there had been no urgent symptoms. I

wonder about that in connection with these appendices that we see filled with bismuth so long. Of course, they were emptied before the bismuth meal was given, otherwise the bismuth could not have entered. I cannot help but think that it may have something to do with the attacks of appendicitis which occasionally follow the bismuth meal.

Dr. A. J. Quimby, New York City: In regard to the tenderness in the right iliac fossa, I have seen the ileum twisted when the cecum is carried over the brim of the pelvis; the twisted ileum is tender, and when the cecum is in the pelvis, that portion which rides over the brim is also tender. This is likely to lead the surgeon or diagnostician astray, as it may be mistaken for a tender appendix. If there is a point in the appendix subjected to a drag when the cecum is carried down, this is where you will find the abnormality, as round-cell infiltration, congested mucosa, etc.

Dr. Edward H. Skinner, Kansas City, Mo.: The question Dr. Pfahler brings up is interesting. Why does the appendix remain filled, and why do not colonic contents which have occupied the appendicial space prevent the bismuth filling? I have one case in mind in which there was an appendix shadow sixteen days after the bismuth meal was given. This case was a duodenal ulceration and a gastroenterostomy was indicated. The operation was performed and the appendix was also removed, but it seemed to be perfectly normal. Again I do not see an appendix after the twenty-four-hour meal. As a rule it does not seem to be filled at that interval. One will see it frequently forty-eight hours after an opaque meal, so that probably the appendix fills from an antiperistalsis of the colon or from the sedimentation of the cecal contents.

Dr. B. C. Darling, New York City: It seems to me that the localization of an organ which may be inflamed is of some value, but tenderness in the right iliac fossa has always been diagnosed appendicitis and even when there are no definite symptoms it may be a good procedure to take the appendix out if it is suspected. Of course, we must bear in mind disease of the ureter or tubes, and it is a good plan to make a roentgenogram with the idea of discovering a possible stone in the ureter to account for any symptoms that may be present. Whether the appendix fills in a certain time, or does not, depends on whether it was empty before the bismuth reached that region. Either way you take it, I do not see that you have direct proof of anything unless you tabulate some five hundred cases, and then study your statistics carefully. I do not see how in the present state of our specialty the mere fact of retention in the appendix can be taken to have any pathological significance.

Dr. L. T. Le Wald, New York City: I have seen two or three cases in which the appendix was removed, and I was interested enough to roentgenograph them. The bismuth was in the appendix. I opened the tube and found that the bismuth was mixed with fecal matter. I think the simple conclusion is that the appendix is definitely sluggish, and that food ordinarily does stay in there more or less at times. In abnormal cases, such as these cases that retain bismuth, this is more apt to occur. I think there is no question but that retention of bismuth is an indication of a sluggish appendix. I would also like to call attention to the analogy to diverticulitis. I have had three cases, and in each of them there was some retention of bismuth in the pockets for over a week, just the same as we see it in the appendix.

Dr. A. Howard Pirie, Montreal: It has occurred to me that here might be an explanation of an appendix which keeps the barium in it for a long time, in a person who in the upright position has his appendix hanging down into the pelvis. The fluid contents of the ileum are churned up when they reach the cecum, and then they begin to settle. The heavy part goes down, and if the appendix is hanging down straight, it is not unreasonable to suppose that the heavier part of the cecal contents settles down into the appendix. When a person lies on his back, the appendix also drops over the brim of the pelvis. In my own case the

appendix was deep down in the pelvis, and that was the reason why it retained the heavy salts so long. I also noticed in one case shown today that the appendix was down in the pelvis. I would like to ask Dr. Skinner whether that was the finding in his case.

Dr. Friedmann, New York City: Dr. Imboden states that retention of bismuth in the lower cecum is a symptom of chronic appendicitis. I have examined such cases, and the only symptom the patient complained of was a coated tongue. These patients had their appendices removed after periods varying from six to eight months. Putting the patient on a mixed diet invariably seemed to bring about some improvement (so far as the coated tongue is concerned). If a re-examination using an opaque (bismuth) meal is made six or eight months after an appendectomy it will in the great majority of cases show retention of bismuth in the lower cecum.

Dr. James T. Case, Battle Creek, Michigan: Dr. Imboden spoke of difficulty in making roentgenograms of the appendix. It is true that it is difficult to make these roentgenograms unless one uses a special wooden spoon technic. It seems to me that this method is not free from danger when one is using the heavy currents necessary for making instantaneous roentgenograms; in fact, I do not see any necessity for making roentgenograms of the appendix because these cases can be examined very well with the fluoroscope, using only one or one and a half milliamperes of current.

I saw the appendix in 600 cases before I stopped counting. I tell you this merely to show that the appendix is easily seen fluoroscopically. The essential point to determine is not whether the appendix fills, but whether it empties. A poorly drained appendix is a dangerous appendix. Of course, an appendix which has an obliterated lumen will not show.

I think Dr. Quimby's remarks on antiperistalsis should be noted. That antiperistalsis exists in the colon it seems to me is beyond controversy. I have seen the actual antiperistaltic waves and have demonstrated them in numerous cases with roentgenograms. I have seen the transport of material from the iliac colon to the hepatic flexure by a so-called mass movement, occurring in eight or ten seconds. I am satisfied that antiperistalsis is a very important factor in normal digestion and one to be considered very carefully in the study of all cases of constipation. If antiperistalsis crowds the fecal material back into the cecum, then it must be easy for it to enter the appendix, and even to pass back into the ileum if the ileocecal valve is not competent.

I am sure you have all seen cases where bismuth has been seen to accumulate in the bottom of the stomach in cases of pyloric stenosis or in the esophagus in cases of cardio-spasm, without any apparent prospects of its going through; you have tried to wash out the stomach and the esophagus in these cases and when you have seen the patient again, the bismuth was still in the stomach or in the esophagus, as the case may be. There is no reason why the appendix should empty itself any quicker than does the colon.

Dr. W. H. Stewart, New York City: It seems to me that it is a question entirely of function. It has been said by numerous writers that the appendix has the same function as the cecum; if that is so and there is a retention for any number of days it certainly indicates a loss of function on the part of the appendix. This retention of bowel contents must act as an irritant. I believe that in every one of these cases there is some pathology in the appendix.

Dr. A. W. Crane, Kalamazoo, Mich.: The subject of appendicitis, of course, never fails to interest the surgeon, and the roentgenologist is often called on to demonstrate the appendix. It has been shown by experimental work, as well as by observation on the part of the surgeon, that just as soon as the lumen is closed, there is bound to be a progressive sepsis in the appendix. Appendicitis means bacterial action, inflammation and swelling; formation of pus; and even a perforation of that organ. Whenever there

is an inflammation of the appendix, excepting a catarrhal process, the bismuth never enters. If you can demonstrate the appendix by means of bismuth, which enters it, you may assume that that is not a surgical appendix, because the lumen is patent. The negative diagnosis is chiefly what we can venture on in a bismuth examination of the appendix. If we see that the appendix fills with bismuth and that it subsequently empties itself, we have demonstrated that it is an appendix without a stricture, and with normal function. That is the most satisfactory report we can make on the appendix. If we fail entirely to show the appendix, we can say nothing excepting that if we can demonstrate a pain point at the cecum where the appendix ought to be, the possibility of appendicitis with obstruction is very great. I think that here, as in other portions of the gastro-intestinal tract, we ought to be very careful about our interpretation. I said before that we should be careful, in speaking of intestinal stasis, about advising operation. I have repeatedly stated before this society that I would not venture to make a report except after a general and complete examination of the patient. We require all that the internist can give us, or the surgeon, for that matter, and should make our own examinations before we interpret the roentgenogram. In my work I am called upon to give opinions and advice. The roentgenologist has been criticized today for presuming to give advice to the surgeon. It is my idea that the roentgenologist should be a general diagnostician, and be prepared to be a consultant on an equal footing with the surgeon or the internist in any case.

Dr. William Seaman Bainbridge, New York City: I have found cases in my own experience where the roentgenologist stated that the bismuth went in and out again, and that these patients had on operation an appendicitis. My experience is different from that of Dr. Crane. I think the general hypothesis is, of course, true, but there are causes of appendicitis where the lumen of appendix is not entirely closed, and therefore the bismuth does enter and find exit.

Dr. Imboden (closing the discussion): Codman claims that upon removal an appendix shrinks one-quarter to one-third in length. This destroys the histologic opinion based on the thickness of the muscular coat. He also says that an appendix which appears perfectly normal when the abdomen is first opened shows tortuous injected blood vessels after manipulation. He also states that the only way one can determine the presence of chronic inflammation is by the formation of peritoneal adhesions, etc.

We have frequently demonstrated bismuth passing into the distal end of appendices which at operation were found to have narrow constricting bands at the proximal end. These usually were slow in emptying and are a dangerous type of chronic appendix. If there is obliteration of the distal end there is no interference with drainage and though the appendix is not normal it probably is not dangerous. Dr. Pfahler's question as to why the opaque meal goes into some appendices and not into others, I cannot answer except for the reason assigned in the paper. It is probable that some of the appendices are filled with fetid contents preventing the bismuth from getting in. I regard Dr. Pirie's explanation as a very acceptable one. Dr. Friedmann must have misunderstood me, or I made a faulty statement. I intended to say that retention in the appendix after the cecum is empty must always be regarded as a probable chronic appendicitis.

OBSERVATIONS FROM THE STUDY OF A THOUSAND GASTRO-INTESTINAL CASES*

By ARIAL W. GEORGE, M.D., and ISAAC GERBER, M.D., Boston.

Fig. I—Carcinoma of esophagus.

During the past two years we have had the opportunity to study about a thousand cases of gastro-intestinal disease with the bismuth method. These have all been private cases, and were all done with practically the same technique, with some additions from time to time, as our experience increased. When we began to analyze the facts obtained in this study, we found as we progressed that it would be necessary to do considerably more work than we had anticipated, in order to make the statistics of any value. We have therefore decided to limit ourselves in this paper to the recording of certain conclusions to which we have arrived as a result of the above experience.

When we first began the routine examination of these cases, we felt for a long time that there was something lacking. One of the writers had an opportunity to see some of Cole's work, after returning from a visit to Europe. It was obvious at a glance that Cole had the fundamentally right idea. The certainty of diagnosis with his method was even at that time so superior to the European methods that we hastened to imitate him as far as possible. From that time to this, if we have had a reasonable amount of success it has been due to the thoroughness of examination of these cases, somewhat along the lines that Cole has used.

Our routine examination is as follows: The patient comes to the laboratory in the early forenoon, having had a very light breakfast, coffee or tea and toast, or the equivalent. We have found this more practicable than having them fasting, as the large majority would complain of headache.

Fig. II—New growth at cardia.

*Read before the American Roentgen Ray Society, Annual Meeting, Sept. 1914.

Fig. III—Ulcer at cardia.

depression, etc., if they came on an empty stomach. These were all private patients coming from their homes. In the case of hospital practice, of course, another method might easily be pursued. Several plates are first taken of the gall-bladder region before any bismuth is given. This part of the examination is made more extensive if there is any history pointing in the least towards gall-stones. This is the only aspect of the history that we are interested in at this time, or that we care to know about before proceeding with the examination. The patient is then given our usual meal, which we shall discuss later. We then take a series of plates to determine as far as possible the exact anatomical condition of the stomach, the first portion of the duodenum, and later the remainder of the duodenum. This involves the taking of plates in the prone, the erect, and the right lateral positions. If there is disease of the oesophagus, we may take the oblique or left-lateral views. Sometimes we find it necessary here, but only rarely, to use the fluoroscope at this point to settle certain problems, especially the question of adhesions. We may casually notice that there are certain functional disturbances present, but we do not attempt to base any diagnostic conclusions upon them. The patient returns again after six hours, in the meantime having eaten a light lunch. One or more plates are now taken according to the requirements of the individual case. Here fluoroscopy in the horizontal position plays a somewhat more important role than before. The problems of fixation of the ileum, or of adhesions about the appendix, pericolic membranes, etc., are cleared up by the manipulation. In many cases, however, it is not needed. This sort of fluoroscopy is still direct examination, as we are actually demonstrating organic lesions, and not functional disturbances. A similar examination is made at the end of twenty-four hours. In many of the cases, the patients return again after two or three days, and a bismuth enema is given. This is studied usually by plates, and information obtained about the anatomy of the colon, and the condition of the ileo-caecal valve. From the above complete examination we are ready to express

Fig. IV—Schirrhous carcinoma involving practically the whole stomach. Not recognized clinically.

Fig. V—(a) Saddleback ulcer. (b) New growth, involvement of the greater and lesser curvature. Operation.

our opinion as to the presence or absence of definite organic lesions. The above constitutes what we have been pleased to call the direct method, in contra-distinction to the indirect or inferential method, where diagnoses are based upon the presence of functional disturbances, the so-called "symptoms-complex." It is with this method of direct examination that we believe the advances of the future will be made, as it is a firm basis on which to build, and one that does not lead into pitfalls of speculation.

We wish now to consider somewhat the standard bismuth meal. This is a problem which has concerned Roentgenologists for some time. Just recently a commission has been appointed in England to consider the question. Just what their conclusions will be, we have no idea, but in this country there has been evolved a meal which we believe may well be considered a standard meal. This is the buttermilk-bismuth meal, which is now in use by many American Roentgenologists. When we started this work, we used Walker-Gordon fat-free lactic acid buttermilk. For purposes of economy we later changed to one of the commercial artificially prepared buttermilks. To our surprise we then began to see the appendix nearly all the time, whereas before we had noticed it only rarely. We have since then kept up this particular brand of buttermilk.

Our present meal consists of 100 grams of bismuth subcarbonate, or its equivalent of barium sulphate, in a mixture of 500 cc. composed of two parts water and one part buttermilk.

The advantages of this meal are many. It is palatable, or with some extremely irritable people, can easily be made so by the addition of a few drops of orange juice or coffee extract. (This, however, we have very rarely found necessary.) This meal carries the bismuth in suspension very easily. It has very little influence upon gastric motility. It very readily fills out the first portion of the duodenum, and indeed the entire duodenum, without any exception. We have found by experience that the buttermilk meal tends to remain more liquefied in the intestines than other mixtures. This we believe is responsible for the practically uniform filling-out of the appendix, if the

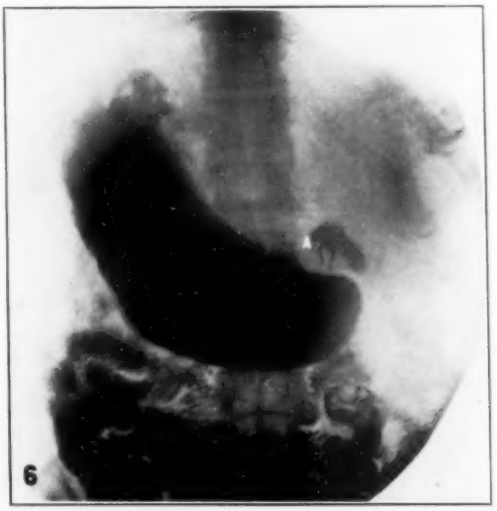


Fig. VI—Roentgen diagnosis—chronic ulcer; possible degeneration. Operation—Dr. King, Portland, Me. Pathological report—adenoma and chronic ulcer.

Fig. VII—Ulcer at pylorus. Operation.

lumen is not obstructed at the proximal end. The same buttermilk mixture in larger amount can be used for the enema. It has no especial effect on peristalsis, and it causes no griping. The suspension here is fair, even in the standing position.

We wish therefore to offer this meal to the members of this society as a standard meal. If you have anything better to offer, we should be glad to use it for the coming year. We hope the society as a whole will be able to take some action on this matter.

Intimately bound up with this problem of the standard meal is the question of the diagnostic significance of bismuth stasis. We refer to six-hour stasis. In our own work, the presence of a residue in the stomach at the end of six hours is the least important of any factor in diagnosis. It is only when we have twelve or twenty-four hour stasis that we lay any significance to it. But even then it merely means obstruction due to some cause, and the determination of the cause must be made by some other more direct diagnostic data.

Fully 60 per cent of our entire series of cases showed some gastric residue at the end of six hours. It is of course perfectly possible that the increased amount of bismuth in our meal may have something to do with this. However that may be, the other advantages of the meal in the direct demonstration of organic disease more than counterbalance this. We have found this stasis of absolutely no value in the diagnosis of duodenal ulcer, as we have very rarely found a true obstructive duodenal ulcer. Carman, in spite of his statements as to its value, found it in only about one-third of his duodenal ulcers. Holzknecht and Haudek found it in only one-fifth of their cases. This sign is of even less value in the diagnosis of gastric ulcer. Apart from variations in meals, stasis may be caused by ptosis, atony, dilatation, pylorospasm due to ulcer, gall-bladder disease, disturbance of the jejunum or lower ileum, chronic appendicitis, and practically all organic lesions of the large bowel. If one could be sure in the study of a case that he could eliminate all the above conditions, he might be able to attach some significance to the presence of stasis. At present we believe one is warranted only in noting that stasis is present,

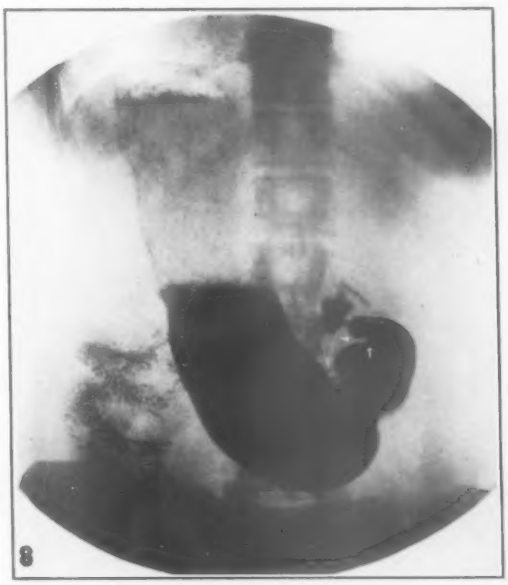


Fig. VIII—Effect of adhesions about the stomach. Operation.

Fig. IX—Surgical findings of Dr. S. J. Mixter. Exploration at operation showed presence of much dilated duodenum due to adhesions which caused a narrowing of the lumen by pressure on the outside. Appendix drawn up and, although not grossly pathological, tied off and removed. Stump carbolized. Many adhesions separated in the right upper quadrant and a gastro-enterostomy (posterior) done with double line of sutures catgut and thru and thru silkworm gut and clips. Excellent convalescence.

and proceeding to make a diagnosis with other means at our command.

About the same situation exists with regard to various motor phenomena, hyper and hypo-motility, hyper-peristalsis, anti-peristalsis, hypertonus, etc. Carman has recently developed at great length his ideas as to the value of hyper-peristalsis in the diagnosis of duodenal ulcer, yet he found it present in only 57 per cent of his series.

Hyper-peristalsis can certainly be caused by many other organic conditons, and often by merely upset nervous influence in stomachs that have no organic disease. We consider it of practically no fundamental diagnostic value.

Hypermotility, or rapid emptying of the stomach, is another disturbance upon which too much schematic value has been placed. Many men have believed that the presence of hypermotility indicated either duodenal ulcer, cancer of the body of the stomach, or simple achylia gastrica. It is certainly true that these diseases frequently are accompanied by hypermotility; indeed we have seen a case of cancer of the stomach where the entire stomach was empty in about ten minutes. The difficulty, however, is that any one of these diseases may be present with absolutely no hypermotility, and, what is more important, hypermotility may be present when none of these diseases exists.

The problem of hypo-motility is essentially the same as that of six-hour gastric stasis, which we have already considered.

Anti-peristalsis in the stomach merely means that there is some organic disturbance present, but it leaves us none the wiser as regards the exact nature of that disease.

All these motor disturbances can therefore be grouped into one class. They are merely functional disturbances, in some cases primary, in other cases secondary to

Fig. X.—Ulcers of duodenum, both of the superior and inferior surfaces.

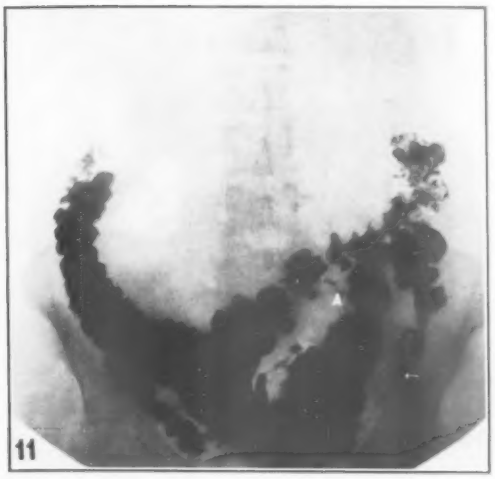


Fig. XI—Young woman eighteen years of age. Twenty-four-hour bismuth plate shows dilatation of the terminal ileum. Operation. Obstruction due to tubercular peritonitis.

some organic cause. To seriously attempt, however, to base a diagnosis upon these disturbances is useless. We can only repeat that the exponents of the direct method ignore these conditions completely as bases for diagnosis.

We will now briefly run over some of the conditions that offer direct positive data for diagnosis.

Simple peptic ulcer is a condition that certainly cannot be demonstrated directly. The diagnosis is sometimes made indirectly, but then it is really inferential, and is very apt to be wrong. Indeed, many authorities today are gradually inclining towards the belief that there is no such thing as a simple ulcer of the stomach, and that the supposed healed "medical ulcers" never were ulcers at all, the hemorrhage being due to some toxic condition such as that accompanying appendicitis.

However that may be, it is certainly true that chronic gastric ulcers, where there is the least involvement of the musculature of the stomach, can be definitely detected by the direct method. Fluoroscopy alone will show some chronic ulcers directly, but it will certainly not show them all. Carefully taken and repeated plates will surely detect them.

Carcinoma of the fundus of the stomach as a rule offers no great difficulties in diagnosis; the defect of filling is quite definite.

Cancer at the pylorus is a distinctly different problem. It is easy to recognize, either on the fluorescent screen or on plates, when it is so far advanced as to make the surgical outlook hopeless. Its detection, however, at a stage when there are no positive clinical signs or symptoms, and while there is still hope of cure with radical surgery, means the most careful work with repeated plates.

Albu of Berlin has recently admitted that the diagnosis of early cancer of the stomach was hopeless both from the clinical and the Roentgen aspects, although he had at first had great hopes in the possibilities of the Roentgen diagnosis. His opinion is due to the fact that his Roentgenologist used the strict Continental or indirect method. The chances of early diagnosis with this method

Fig. XII—Constriction of the terminal ileum due to scar tissue. Operation.

Fig. XIII—New growth at hepatic flexure. (Six-hour.) (a) Artist's drawing made at operation showing small involvement of bowel, gall bladder and liver.

are indeed hopeless. With the direct examination of the pyloric region, however, using repeated plates in the different positions, we feel warranted in stating that the diagnosis of cancer in this region can be made long before there are any definite clinical data, and at a stage when there is some hope in surgery. This hope will be increased in the future.

The problem of the Roentgen diagnosis of duodenal ulcer is, we trust, settled by this time. The direct method of examination of the duodenum gives diagnostic results which, while not quite like Ivory soap (99.9 per cent pure), are still far ahead of anything that the exponents of the indirect methods, either in this country or abroad, have been able to offer.

Pathological conditions in the right upper quadrant generally offer a very fascinating field for study. Adhesions, membranes, veils and new growths can be definitely demonstrated.

The problem of gall-bladder disease is one which at present seems to be of the greatest interest to Roentgenologists. Gall-bladder disease is detected either by showing an enlarged gall-bladder, adhesions to the duodenum, gastric antrum, hepatic flexure or transverse colon, and finally by the direct demonstration of gall-stones. When we first began this work the diagnosis of gall-stones was made very rarely. We would sometimes notice gall-stones during the course of our bismuth examinations, but they were always stones containing a large amount of calcium, which could not easily be overlooked. During the past year, however, we have paid more attention to this problem, so that to-day we make an examination of the gall-bladder region for stones before the regular bismuth meal is given. In consequence we have been able to detect gall-stones that previously would have been entirely missed.

For practical purposes gall-stones may be divided into two classes, those that are easy to find and those that are difficult to see. The first group contains a relatively large amount of calcium in combination with bile-salts. The second group contains less calcium, and more cholesterin, which is easily penetrated by the Roentgen rays. It is this second group with which we are at present especially concerned.

The one essential in the diagnosis of difficult gall-stones is extreme care. Care must

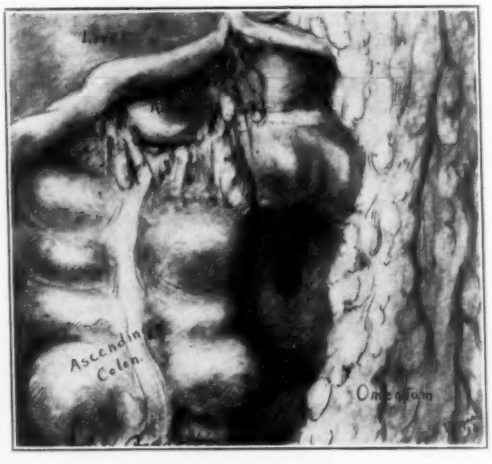


Fig. XIII-a

Fig. XIV—Small annular carcinoma of descending colon. Operation.

be taken that the parts are quiet; not only must the patient himself be still, but the plates must be taken rapidly enough so that the entire gall-bladder is at rest in the true sense of the word. A large number of plates must be taken. Frequently the very last plate of a series will be sufficient to make a positive diagnosis of stones when all the others merely gave "suspicious" evidence.

We believe the figures generally quoted are far lower than can actually be done. A year ago 10 per cent would have been considered a high estimate for successful demonstration of gall-stones. Today the men who have done much of this work generally believe that at least 50 per cent of all gall-stones can be detected. Pfahler has shown over 70 per cent in a small series, although he confesses that 50 per cent would be nearer the correct general figure. Still his high percentage was obtained because he used extreme care in this small series. The same care applied generally will, we believe, push this figure far higher. Indeed, we believe that all gall-stones will show on the Roentgen plates. The problem is to learn to recognize the shadows of the stones of the second group. We have ourselves certainly not made positive diagnoses of gall-stones in all the cases in which they were later found at operation. But we will state that in every single case in which gall-stones were removed, and where a negative Roentgen opinion was passed, when the plates were later carefully studied we were always able to see the shadows of the gall-stones. The trouble was not with the Roentgen method. The trouble was with our own acuteness of observation at the time of the pre-operative diagnosis. The problem of the future, then, is to learn to recognize these shadows which the Roentgen rays will surely produce. When this can be done, then 100 per cent of gall-stone diagnoses will be made; and we do not believe that this is an idle dream or that its achievement is a great ways off.

In our exhibit this year we have shown a number of the different types of stones, but especially those of the second group which demand the care in diagnosis.

Fig. XV—Patient, male, 30 years of age. Symptoms for six weeks. Plates show a large mass involving the rectum, sigmoid and descending colon. Operation—probable sarcoma. Considered inoperable.

Fig. XVI—Gallstones.

The lower right quadrant of the abdomen at present offers considerable positive evidence of disease by direct examination. Disease of the terminal ileum, kinks and adhesions are well shown. Fixation, adhesions, kinks and obstructions of the lumen of the appendix can be definitely shown. New growths and tuberculosis of the caecum as well as the presence of veils, adhesions and membranes can be diagnosed. The same conditions along the rest of the colon, as well as the presence of intra- and extra-intestinal tumors should be demonstrated.

To sum up, we believe that with our method thoroughly carried out we are warranted in making a definite positive or negative diagnosis in regard to the presence of organic disease of the gastro-intestinal tract requiring surgical treatment, with at present still the possible exception of gall-stones. We feel that this examination can be likened to an exploratory operation. In fact, many times we can show more about the pathology of the gastro-intestinal tract than the average surgeon can detect at a single operation. These statements, however, apply only to the examination when carried out completely, with the direct point of view always in mind. They certainly cannot be applied to an examination which is based largely upon fluoroscopy, and where the latter is used chiefly to elicit signs of purely functional disturbances.

259 Beacon Street,
Boston.

LOSSES IN TRANSMISSION AS A SOURCE OF ERROR IN X-RAY DOSAGE

From the Department of Roentgenology, University of Michigan

By JAMES G. VAN ZWALUWENBURG, B. S., M. D.

If any apology is necessary for a communication on so fundamental a topic as the above, the writer can only plead that he has never seen any reference to the gross inaccuracies which, by the neglect of simple precautions, may be introduced into the problem of electrical measurements of X-ray dosage. And I cannot help but feel that others are making similar serious errors through a lack of appreciation of the magnitude of such losses and of the rate with which they increase with an increase in the tension on the transmission lines.

Bearing in mind the serious warnings of several speakers at the recent Cleveland convention against over dosage by the Coolidge tube, an attempt was made in this laboratory to establish the energy equivalent of an erythema dose under standard conditions. Dr. J. T. Case's assertion that, with his apparatus, from twelve to fourteen milliampere-minutes with a ten-inch parallel spark constituted an erythema dose served as a point of departure. In as much as our apparatus is identical with his in most particulars, and I had been fortunate enough to have had a chance to carefully observe the technique employed at Battle Creek, I confidently expected to verify his results. After about six weeks of use of a Coolidge tube I have not yet produced an erythema, although the dose has been cautiously increased to twenty milliampere-minutes.

Moreover, a conspicuous difference in the heating of the target of the tube under similar conditions of control and milliammeter reading was observed. If the heating of the tube is any index of the energy delivered there, and if the energy bears any definite relation to the quantity of X-rays produced, there was evidently a wide difference in the doses given under the same conditions of control. Finally, when a slight and presumably immaterial change in the aerial wiring was made, it was found that the technique previously laboriously developed gave entirely different readings. The obvious losses along the high tension wires had been under suspicion for some time, and the following measurements were undertaken to get some idea of their magnitude.

The tube used is the ordinary Coolidge radiographic tube, the filament is heated from a well insulated overhead storage battery equipped with the charging device made by Waite and Bartlett, the transformer is a Snook 10 K. W., A. C. machine, the three aerial wires at 12-inch intervals traverse the length of two rooms. The parallel spark gap is Snook's usual type with adjustable sharp points, and the milliammeter is mounted just above the transformer and between it and the parallel spark gap. An extra milliammeter was mounted on a well insulated stand within 18 inches of the tube and introduced into the positive side of the circuit.

After a few preliminary tests, the experiment whose protocol follows was conducted in the following way: The 12-volt current was so adjusted as to give a selected reading of high tension current on the fourth rheostat button. The rheostat was then varied successively from 0 to 10, the readings of the ammeters recorded, and the spark gap determined. The data of experiment No. 4 is given as a representative of the series, and the charted results are also reproduced. Considering that neither of the ammeters have been calibrated and the determination of the parallel spark gap is notoriously uncertain, the curves are remarkably smooth and consistent.

As will be seen, no appreciable difference in the readings of the two instruments is observed until a parallel spark gap of about three inches is reached. From there on, the difference (represented by the dotted curve) rises rapidly as represented by a curve concave upwards until, with a 9.7 inch parallel spark, it reaches 3.8 milliamperes, or about 65½% of the current registered by the instrument placed in the usual position on the machine. This difference represents losses in "silent discharge," "brush discharge," "coronal discharge," etc. In another experiment where but one milliampere was admitted to the tube as measured by the instrument placed beside it, only 20.9% of the indicated output of the transformer reached the tube.

In radiographic work with relatively low tensions and heavy tube currents, these errors are truly negligible, but under deep-therapy conditions they become far from so, and deserve serious attention.

It will also be observed that the full saturation current in the tube is not reached before an appreciable loss occurs on the wires. At no stage of the experiment was the reading on the main milliammeter the correct measure of the current flowing through the tube under the ordinary deep-therapy conditions.

So far, no satisfactory technique for gauging the tube current other than a separate ammeter has been devised. The tube cannot be adjusted for a given amperage at a tension lower than that which it is intended to apply because (with our installation) leakage is already evident at the point where the current reaches saturation. Moreover, during a long treatment, the low tension direct current supplied to the incandescent filament is almost certain to suffer a drop in voltage resulting in under dosage. The estimation of the losses by readings in open circuit tally fairly well with those given above, but the variations at or about the tension represented by a 10-inch parallel spark gap are so great as to make any empirical correction deceptive. The introduction of a separate instrument as close to the tube as possible is inconvenient but apparently essential.

Conclusions derived from these data naturally are applicable only to the installation under investigation (which is probably exceptionally faulty). We have satisfied ourselves that the main loss of energy occurs along the long stretch of parallel aerial lines and not at the points of the parallel spark gap. It is an easy matter to exclude the latter from the ammeter circuit but this does not improve matters materially.

The advantages of an electrical equivalent for radio-therapeutic doses lie largely in the accuracy with which they can be measured, and the certainty with which they can be reproduced. We are now in a position to meet the latter condition with a high degree of accuracy by means of transformers delivering waves of definite form and tubes which can be satisfactorily controlled. The former condition requires only the appreciation of the possible sources of error and rational measures to meet them.

Theoretically, we can with certainty reproduce radiant energies identical in character and in any desired quantity, and therefore presumably comparable in physiological effect. Not only is the operator able by comparison of successive efforts to perfect his own technique, but his results should be and, undoubtedly, will be strictly comparable to those of other operators employing the same transformer and therefore using rays of similar "spectra." This naturally presumes strict accuracy of measurements.

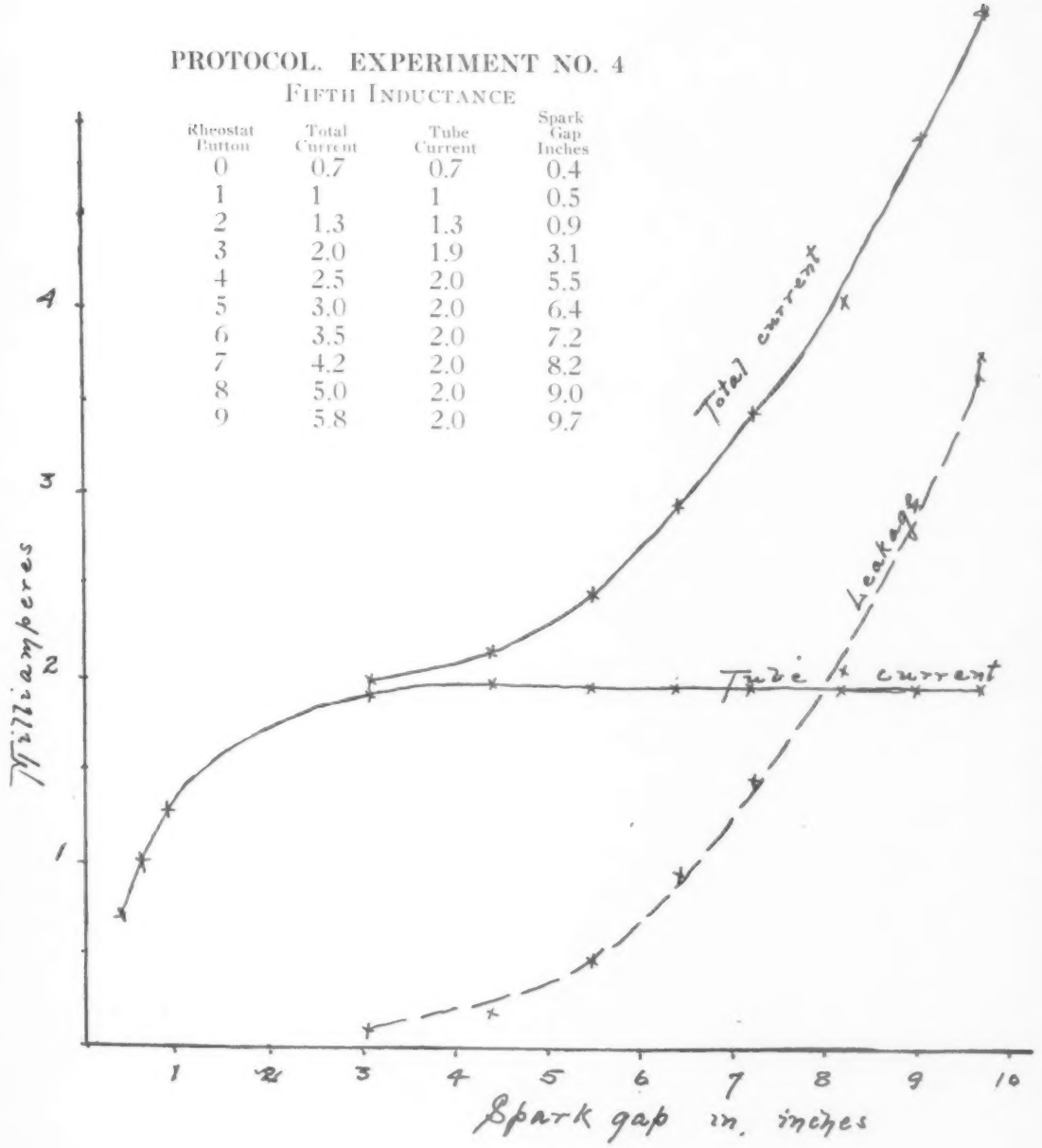
927 Cornwell Place,
Ann Arbor, Mich.

Foot Note:—(It is worthy of note that the distributor regularly furnished by the maker of this transformer includes the parallel spark gap in the circuit passing through the milliammeter).

PROTOCOL. EXPERIMENT NO. 4

FIFTH INDUCTANCE

Rheostat Button	Total Current	Tube Current	Spark Gap Inches
0	0.7	0.7	0.4
1	1	1	0.5
2	1.3	1.3	0.9
3	2.0	1.9	3.1
4	2.5	2.0	5.5
5	3.0	2.0	6.4
6	3.5	2.0	7.2
7	4.2	2.0	8.2
8	5.0	2.0	9.0
9	5.8	2.0	9.7



A CASE OF FRACTURE CONFINED TO THE PETROUS PORTION OF THE TEMPORAL BONE*

By E. B. GLEASON, M. D., and G. E. PFAHLER, M. D., Philadelphia, Pa.

CLINICAL REPORT BY DR. GLEASON.

The man came to the Ear Dispensary of the Medico-Chirurgical Hospital on the third day following an injury of his right ear. He stated that he had slipped on the cellar stairs and struck the right side of his head against a post with such violence that he remained unconscious for about two hours. He had had a discharge of blood from his ear. He was deaf and suffered from vertigo.

Upon examination, dried blood was removed from the canal. The membrana was intact, but there was a break in the skin of the roof of the canal about ½ inch in length immediately in front of the drum head. Upon inflation of boric acid, the powder adhered to this crack clearly differentiating it from the surrounding skin. Hearing for the watch was reduced to contact. Weber better in the well ear. Rinné for the right ear was positive but shortened.

There was no spontaneous nystagmus when the patient looked straight ahead. With the eyes directed to first one side and then the other, there was slight nystagmus probably physiological although possibly greater toward the left than the right. Turning tests gave a ratio for the horizontal canals of 24 to 18 seconds and for the vertical canals of 20 to 15 seconds in favor of the well ear.

At the patient's first visit to the dispensary, slight facial paralysis was noticed which increased during the next few days but never became complete.

As concussion of the labyrinth or hemorrhage would account only for the symptoms referable to the acoustic and static labyrinth and not for the discharge of blood from the canal and the increasing facial paralysis, a provisional diagnosis of fracture of the petrous portion of the temporal bone was made and the patient referred to the X-ray department of the hospital to have the diagnosis verified.

The patient remained under observation for about three weeks, during which time, after about the tenth day the facial paralysis began to improve. The hearing also somewhat improved and the reaction to turning tests became more nearly normal.

ROENTGEN DIAGNOSIS OF FRACTURE CONFINED TO THE PETROUS PORTION OF THE TEMPORAL BONE, WITH REMARKS ON SKULL FRACTURES.

In the case referred to me for Roentgen study, and reported above by Dr. Gleason, I at first made a general examination of the entire skull. Stereoscopic plates were made of each side of the skull, and a postero-anterior and an antero-posterior plate was made. These showed no evidence of fracture, because they were too general. I then made a second examination, using a very small diaphragm and confining my study to the petrous portion of the temporal bone. I then found clearly a line of fracture shown in both plates, which was limited to the petrous portion of the temporal bone, and extended antero-posteriorly across the bone at a depth of about three-fourths of an inch, as is clearly shown in the accompanying illustration. A photograph of the patient was made on the same day to show the facial paralysis, the patient being conscious and suffering no other inconvenience than right side deafness and right facial paralysis. It seems to me that the clear demonstration of this fracture, as the cause of these symptoms, is of sufficient importance to be placed

* Read at the meeting of the Section on Otology and Laryngology of the College of Physicians, Philadelphia, February 17th, 1915.

on record. I believe it to be the first case of this kind diagnosed Roentgenographically.

Grashey[1] refers to a case in a man forty-three years of age, who was injured in a trolley accident five days previously, became unconscious, bled from both ears, in which he found a longitudinal fracture extending from the occiput through the parietal bone and petrous portion of the temporal bone, and through the base of the skull.

At a second examination, made two years later, at a time when he was entirely free from symptoms, the line of fracture could still be seen.

Grashey also demonstrated before the German Roentgen Society, in 1909, an interesting case of fracture of the base of the skull. The patient, a man forty-five years of age, had been thrown from a horse two years previously, was unconscious five days. The examination made two years after the injury showed very clearly a line, fully a millimeter in breadth, which extended obliquely from the upper angle of the occipital bone, through the petrous portion of the temporal bone.

In a personal interview in his laboratory in Munich, Grashey referred to a fracture of the vault of the skull, which he had diagnosed by the Roentgen rays but which could not be recognized macroscopically at the autopsy. He had the section of the skull removed, however, and examined microscopically, when the line of fracture was found corresponding exactly to the Roentgenogram.

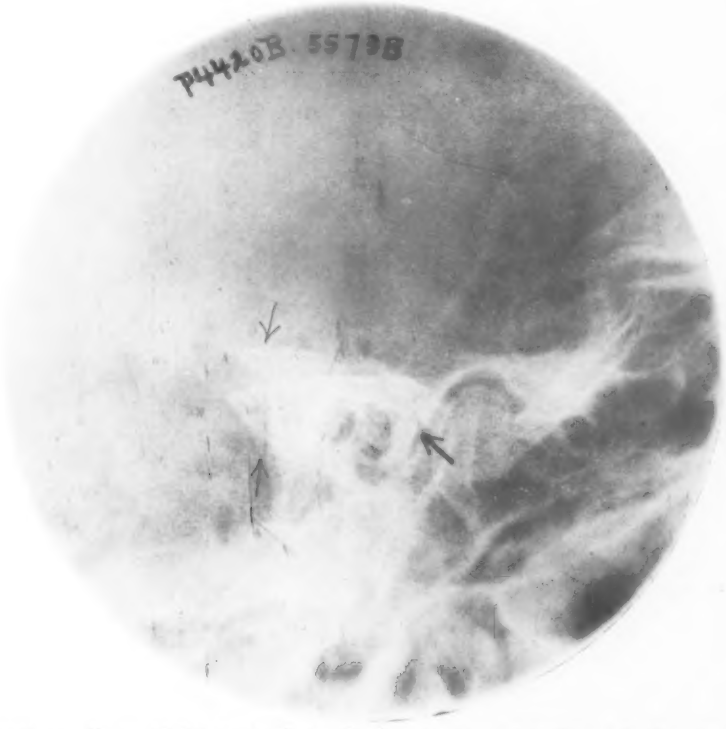


Fig. 1. Arrows indicate lines of fracture through the petrous portion of the temporal bone. The tempero-maxillary joint can be seen anteriorly to the right of the arrows.

The remarkable thing about Grashey's reports is, first, that a fracture could be clearly demonstrated two years after the injury. One cannot, of course, conclude from this that all fractures can be demonstrated after two years. The second point of interest in Grashey's third case referred to, is

[1]Grashey: Atlas chirurgisch-pathologischer Röntgenbilder, München, 1908.

Fig. 2. Photograph showing complete palsy of right side of face.

that a line of fracture could be recognized in the Roentgenogram that could not be seen macroscopically at autopsy.

Stewart, of New York, in a verbal report before a meeting of Roentgenologists at Atlantic City, January 30, 1915, at which time I demonstrated the Roentgenogram of this case, reported that he has seen two fractures of the base of the skull, extending through the petrous portion of the temporal bone, but that in these cases the fracture was not limited to the petrous portion of the temporal bone, and the patients had all the general symptoms of a fracture at the base of the skull.

I have been unable to find in literature the reference to any case of fracture confined to the petrous bone diagnosed by Roentgen rays, and therefore believe this report to be the first case on record. I believe it to be of importance as a basis of medico-legal evidence, and also in suggesting that obscure cases of deafness and facial paralysis might at times be cleared up by a careful Roentgen examination. I also wish to emphasize that the ordinary examination in which the entire skull is included is apt not to show such a line of fracture as is illustrated in the above case, and that the fracture will be shown only by the use of small diaphragms, which will limit the field of investigation and give correspondingly sharper and clearer definition.

I believe that most, if not all, fractures of the skull can now be diagnosed by the Roentgenograms, if they are examined within a reasonable time after the injury. As is shown by Grashey's experience, at least some can be diagnosed two years after the injury. However, as is to be expected, the longer one waits for such an examination the less clearly will the line of fracture be shown. The more one can confine the examination to a limited field, the smaller the diaphragms that can be used, the more certain will be the diagnosis, whether positive or negative.

CALCAREOUS CYST OF THE KIDNEY

By JAMES T. CASE, M. D., Battle Creek, Michigan

Fig. I. Roentgenogram of the enema-filled colon showing the relation of the suspicious right upper quadrant shadow to the hepatic flexure. Stereoscopically this shadow was seen to lie somewhat behind the plane of the bodies of the vertebrae.

The following case reported before the Chicago Roentgen Society, March 13th, 1914, illustrates one of the rarer sources of error in the interpretation of shadows found in the right upper quadrant of the abdomen.

The patient, E. B., age 59, complained of headaches from which he had suffered since childhood. These headaches seemed to become more severe at intervals of two or three months; in the interim they were dull and were associated with a lameness in the back of the neck. The headaches were always occipital. The patient has been a heavy eater all his life, and has often complained of a heavy feeling in the epigastrium which, as he expresses it, feels "as though he had a shot in his stomach." There was no nausea or vomiting, nor any heartburn. There was every clinical evidence of alimentary toxemia, although the bowels were fairly regular in their action. The blood findings were negative. The blood pressure findings were as follows: systolic 125, diastolic 105. The pulse varied from 74 to 90. The gastric analysis following a Ewald test breakfast was negative except for a slight increase in the total acidity and the free hydrochloric. There were no other findings of importance relating to the stomach. A bismuth meal showed no abnormalities of any consequence in the stomach or bowel.

In the course of the bismuth meal examination, there was discovered a mass about the size of a dollar, ovoid in shape,

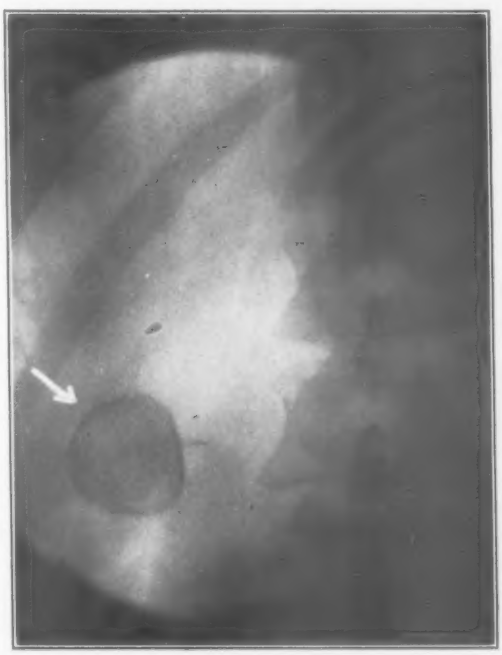


Fig. II. The suspicious right upper quadrant shadow as it appeared in a roentgenogram made for right renal calculus.

Fig. III. Photograph of the calcareous cyst of the kidney after it was removed.

occupying a position in the right upper quadrant of the abdomen. Stereoscopic colon plates, in which this shadow appears very nicely, showed the shadow to lie considerably behind the hepatic flexure, suggesting that it was of renal rather than gall bladder origin. A lateral roentgenogram showed the calcareous mass to lie behind the plane of the bodies of the vertebrae.

The urine examination made June 27th, 1912, showed no pus, blood or albumin. There was nothing in the chemical findings to suggest disease of the kidneys.

Immediately following the roentgen examination, the patient was obliged to go home. Business affairs prevented the patient from returning until September, 1913, at which time another roentgen examination was made, which I reported as follows:

"I have re-examined the right side and find the same shadow, about the size of a silver dollar, corresponding to the right renal or gall bladder region. I believe the shadow is renal for the reason it is larger on the gall bladder plates than on the kidney plates. The possibilities, it seems to me, are the following: Gall stone, renal calculus, calcareous cyst of the kidney. On account of the comparatively faint shadow and its perfect uniform density, I am rather inclined to the idea of a calcareous cyst of the right kidney. Stereoscopic plates following the passage of a catheter up the right ureter ought to give confirmation."

The examination of the urine a few days later showed albumin, pus, blood and epithelial cells, but not until after a catheter had been inserted on two previous occasions. As will be seen from the later report of the cystoscopic examination, there was no reason to believe that any urine at all was passing from the right ureter.

Cystoscopic examination by my colleague, Dr. W. F. Martin, showed the left ureteral orifice perfectly clear and easily catheterized, the catheter passing into the kidney without difficulty. The right ureteral ridge was unusually prominent, and at the side where the ureter should be, there was a slight depression, but the catheter would not pass. Urine of normal appearance and composition was obtained from the left ureter at a rather more rapid rate than usual. No urine at all was seen passing from the right ureter.

The renal efficiency test, after intravenous injection of phenolsulphonephthalein, showed color appearing in three minutes from the left kidney, a total of 29%, being eliminated in half an hour. No urine at all was secured from the right ureter.

Finally, after careful consideration and having regard for the patient's wishes in the matter, Dr. J. H. Kellogg decided to operate. The right kidney could not be located, but instead a small mass the size of a

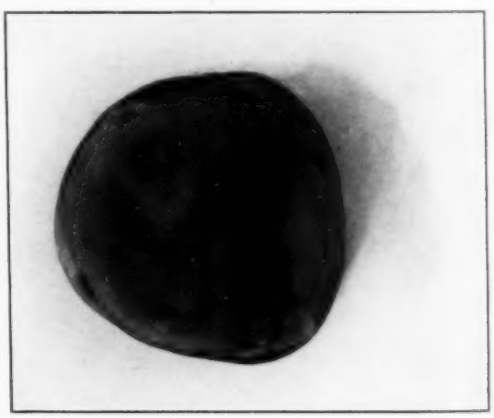


Fig. IV. Roentgenogram of the removed mass.

hen's egg was palpated, high up under the ribs, in the normal position of the right kidney. A very careful digital examination was made to ascertain if there was any other kidney on that side, but none could be found. The mass was removed. Later, a careful examination of the mass showed it to be a thin shell filled with a brownish-looking fluid. The shell was about as thick as that of a goose egg.

The patient's recovery was uneventful. Sufficient time has not yet elapsed since the operation to draw any conclusion as to its influence upon his general health.

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EDITORIAL

The recent trend in the construction of transformers for Roentgen work in equipping machines with a voltage selector, prompts the editor to turn back to an article published by the late Dr. Vernon J. Willey in 1907. The title of his article was "Some Experiments with Roentgen Tubes with Respect to Their Use for Diagnostic Work," and while the entire article was a finished piece of work and a decided contribution to Roentgen technic, we would like to insert the following quotations, showing how years ago he had anticipated this use of variable voltage:

"When one wishes to make use of low vacuum or soft tubes for certain kinds of work, it is highly desirable to be able to excite the coil by a lower voltage than 220; indeed a voltage below 110 is oftentimes of advantage in reducing the inverse E. M. F. of the secondary. In fact, a variable voltage excitation has many advantages."

"This was accomplished at the University Hospital Roentgen Laboratory by designing and constructing an auto-transformer for the three-wire, 220-volt, 60-cycle alternating current obtained from the city lighting mains."

"The three-wire 110 to 220 volt alternating current mains permitted us to use an auto-transformer built for 110 volts, this being connected across one side of the line. Then, by using the neutral and the transformer taps, we can get from zero to 110 volts, and by throwing a double-throw, single-pole switch and connecting in the other side of the line, and again using the transformer taps, we can get from 110 to 220 volts."

* * *

"The advantage of the variable voltage excitation of the primary is that, not only the inverse E. M. F. be made so small as not to force current inversely through low-vacuum tubes, but *the current* in the *primary* and the *secondary output* may be *controlled* over a much *greater range* than by a *rheostat alone.*"

February 2, 1915.

P. M. Hickey, M. D.,
Detroit, Mich.

Dear Doctor:

To whom does a roentgenogram belong—the roentgenologist, the physician referring the case for diagnosis, or the patient?

Is it a fixed rule that the plate is the property of the person paying the bill?

Have there been any court decisions covering this point?

With personal regards, I am

Fraternally yours,
Signed GRAY C. BRIGGS.

This letter was referred to Dr. Skinner and we append his answer, which we think will be of great interest to all Roentgenologists.—ED.

Dr. Gray Chandler Briggs,
203-207 Wall Building,
Saint Louis, Mo.

Dear Doctor:

There are no court decisions covering the point as to whether the roentgenogram belongs to the roentgenologist, the physician referring the case for diagnosis, or the patient. It is not a fixed rule that the plate is the property of the person paying the bill.

This question was brought up at the 1908 meeting of the American Roentgen Ray Society, by Dr. Stover of Denver. At that time the following resolutions were passed by the American Roentgen Ray Society:

RESOLVED: That the American Roentgen Ray Society endorses the views presented in Dr. Stover's paper, vesting a property-right in the radiogram, with the radiographer, inasmuch as the radiogram is a part of the clinical record of the examination.

Dr. Stover's article was published in the transactions of the American Roentgen Ray Society of 1908, page 15. The title of his article is "The Value of the Roentgenographic Examination." Another article by Stover appeared in the American Quarterly of Roentgenology, Vol. III, No. 2, page 131, July, 1911, under the title, "The Radiographer's Right in the Radiogram." The German Roentgen Society in 1912 made the following pronouncement regarding your inquiries, in paragraph IV of a resolution concerning the position of the radiologist in the medical profession. This resolution states that, "All plates, diapositives, tracings, orthodiagrams, and teleoroentgenograms prepared for the diagnosis of the case are the property of the roentgenologist, just as histological preparations belong to the consulting pathologist. The roentgenologist will, however, as a matter of courtesy, be always ready if requested to place his plates and prints at the disposal of the consulting physician."

You will find a very complete exposition of this subject in a review published in the Interstate Medical Journal, 1913, Vol. XX, No. 2, under the title, "The Position of the Radiologist in the Medical Profession. The Ownership of X-ray Negatives and Prints." This article also contains a very complete bibliography of articles which mention the subject of your inquiry.

Yours very truly,
E. H. SKINNER.

1018-23 Rialto Bldg.,
February 10, 1915.

ANNOUNCEMENT CONCERNING THE ANNUAL MEETING

Richmond, Va.,
February 13, 1915.

Now that the time and place for the 1915 meeting have been determined upon, our activities must be directed toward making the coming meeting the best in the history of the Society.

While Atlantic City is not geographically central it is within easy reach of the great majority of our members. Again, everybody likes to go to Atlantic City. The time selected, September 22-23-24-25th, is one of the best seasons for a visit to this popular resort, and the selection of the beautiful Chalfonte Hotel as our headquarters leaves little to be desired for convenience and comfort.

We have been particularly fortunate in obtaining the hearty co-operation of a most efficient and active Committee of Arrangements. With Wescott as Chairman on the ground to see that the plans are executed and with the energies of Jaches and Stewart of New York and of Pancoast and Newcomet of Philadelphia we are assured that every detail will be satisfactorily carried out.

By reason of the war we shall be deprived of the pleasure of visits from representatives of the European Societies, and while they labor in the cause of humanity our efforts should be redoubled looking toward the acquirement of new knowledge and technique that the science of Roentgenology may not suffer.

Our membership should be materially increased by addition to our ranks from the large number of good men who are now confining themselves to the practice of Roentgenology. There is little time in which to turn in names of applicants for membership, the By-Laws requiring that each application shall be in the hands of the Chairman of the Executive Committee six months previous to the meeting date. Our members should be careful that their endorsements be made upon a personal knowledge of the work and professional standing of the applicant that the Society may escape numbering among its members any but the ethical doctor and true scientist.

Prospects are bright for a most instructive and interesting program, and I wish to urge the members to forward me the titles of their papers as soon as possible so that they may be properly classified and the program attractively arranged.

Yours faithfully,
ALFRED L. GRAY,
President.

ANNUAL MIDWINTER MEETING

A regular mid-winter meeting of Roentgenologists was held Wednesday, March 3, Hotel Sherman, Chicago, under the auspices of the Chicago Roentgen Society.

Meeting called to order by Dr. Potter at 11 A. M. Dr. Hulst was elected to act as chairman. The morning session was devoted to the reading of the following papers:

Roentgen Therapy for Lymphangioma and Angioma.—Dr. E. H. Skinner.

Syphilis of the Stomach (and slides).—Dr. Le Wald.

Syphilis of the Frontal Sinuses (and slides).—Demonstration of the Spleen (and slides).—Dr. P. M. Hickey.

The Use of Radium on X-Ray Hands.—Dr. S. Tousey (read by Secretary).

General discussion followed each of the papers.

Meeting adjourned till 2 P. M.

Afternoon Meeting: Talk on Stereoscopic Method in Locating Foreign Bodies—By Dr. Beck (Stereo prints and foreign bodies shown).

Balance of afternoon session given to showing of slides.

Dr. Le Wald—End Results in Abdominal Surgery and Infarction of Large Intestine.

Dr. Blaine—Rare Bone Lesions.

Dr. G. E. Pfahler — Cases for Diagnosis.

Dr. A. M. Cole—Gastric Ulcer and Shadows resembling Renal Calculi.

Dr. M. B. Fitterington—Gastric Ulcer.

Dr. S. B. Childs—Pyopneumothorax, Cyst of Brain, Subphrenic Abscess.

Dr. E. Skinner.

Dr. H. E. Potter—Fractures of Spine.

Dr. Crane—Hirschsprung's Disease.

Dr. Cole—Aneurysm of Heart and Broncholiths.

Plates shown by Dr. Fortier of a Foetal Monster and Dr. Potter a case of Diaphragmatic Hernia, also a new apparatus for Serial Pylorography.

On the day following a tour of various hospitals and private laboratories was arranged for and made by a number of the visitors.

An informal dinner preceded the evening meeting which was held in conjunction with the Chicago Medical Society. An account of this meeting as reported for the Chicago Medical Society Bulletin follows:

Joint Meeting of the Chicago Medical Society with the Chicago Roentgen Society

A joint meeting of these societies was held March 3, 1915. The meeting was called to order by Dr. J. A. Clark, president of the Chicago Medical Society, who introduced Dr. Adolph Hartung as chairman of the meeting.

Roentgen Therapeutics of Superficial Lesions.

Dr. William Allen Pusey stated that in the very early days of the use of X-rays he formulated what seemed to him the physiological actions of X-rays for therapeutic purposes, and they were these: 1. Their effect in producing atrophy of the appendages of the skin. 2. Their destructive action upon organisms in the skin. 3. Their stimulating action upon the skin. 4. Their power of destroying certain normal tissues, such as blood vessels, and some of the diseased tissues, such as carcinoma cells, lupus cells, before they destroyed the connective tissue troma. 5. Their anodyne action.

This furnishes a rather comprehensive collection of physiological actions and covers a large group of cutaneous diseases.

He has treated many cases of hyperidrosis with X-rays, and says the method is unreliable and not to be recommended.

In sycosis and tinea sycosis, and suppurative folliculitis, and hairs in general, his experience agrees with that of other men, that the X-rays are a useful addition to our methods of treatment. He knew of no other way of curing some cases of sycosis except by the use of the X-rays, and he constantly reverted to their use now. In tinea tonsurans, X-rays have proved a veritable boon.

With reference to acne, it is a skin disease that one can attack with assurance of definite results with the X-rays, and a long experience with their use has increased his confidence in them.

As to furunculosis, the X-ray is not the first method of treatment, but in areas where there are recurrent furuncles he has found the X-rays of very distinct value.

For the purpose of relieving itching, the X-ray has a field of usefulness. In chronic eczemas one can do a good deal by the use of the X-rays, but they offer no advantage as a stimulation over modern methods at our command, and so for the relief of itching the X-ray has only a limited field of usefulness in his experience. The same statement applies to lupus erythematosus. The results from the use of the X-ray are not as beneficial in lupus erythematosus as from some other agents that are in use. The same applies to such skin affections as lichen planus and psoriasis. He has seen many cases of psoriasis, which were very intractable, benefited by the X-rays. The use of the X-ray in psoriasis is attended with more risk than in patients of normal susceptibility.

In the treatment of pigmented naevi we have the possibility of using X-rays for the removal of hair, and the rays have considerable effect upon the other hypertrophic tissues; that is, the pigment and the other tissues in cases of naevi. He has had many cases that may be considered successful results of pigmented naevi treated by X-rays. The same applies to X-rays in vascular naevi.

In lupus vulgaris, he has seen some cases in which the X-rays have given help where other methods have failed.

The X-rays may be used in cases of cervical adenitis with benefit where there are fistulous tracts.

As to blastomycosis, an affection which requires in addition to potassium iodid some method of local destruction of the lesions, it is the author's experience that the X-ray is the most satisfactory of the local agents for use in that condition. Practically all cases of blastomycosis that are localized in the skin can be cleaned up by the use of X-rays, with the support of potassium iodid, neither of which alone does the work so well.

The X-rays have a great field in the treatment of epithelioma, and his attitude towards the use of the X-rays in the treat-

ment of epithelioma has not in any way changed. In fact, it has been strengthened by many years of experience. There is no epithelioma confined to the skin which cannot be cured by the persistent and intelligent application of the X-ray. He has treated epitheliomas with the X-rays that covered almost a square foot of surface and cured them. He has treated now over one hundred epitheliomas of the lip, and as he remembers now, the percentage of failures was two per cent in approximately fifty cases that had been followed from three to ten years.

As to the technic, he follows the technic that he began with in the early days. He gives the applications in broken doses, continuing the weak applications until he gets the reaction desired. This is not the modern technic by which many men get the same results by one or two major doses. His reasons for holding to the technic he began with are that he has done better than by adopting the more energetic methods. He has found his technic safe.

Roentgentherapy in Deep-Seated Non-Malignant Lesions.

Dr. James T. Case, of Battle Creek, Michigan, said the term "deep Roentgentherapy," in its modern sense, carries with it a very different meaning from deep Roentgentherapy of ten years ago, and the results are several hundred per cent better even than three years ago. Literature three or four years old is largely unreliable as a basis for conclusions as to present indications for the deep application of very hard X-rays.

This new significance of the term "deep Roentgentherapy" is due, firstly, to the invention of the Coolidge tube, which has placed in the hands of Roentgen workers a very powerful, but precise, treatment, by the use of which it is possible to control the dosage with very great practical accuracy; secondly, the perfection of newer and more powerful sources of high tension current; and thirdly, the development of a technic involving filtered irradiation at short focus—skin distance through multiple skin areas.

Accurate estimation and recording of dosage is now possible and should be compelled. Rays of much higher penetration are now available, and thanks to filtration through heavy aluminum, can be used in twice the usual amount on each skin area. By dividing the skin overlying or surrounding the organ to be treated into a number of areas, using each as a port of entry (cross-fire method), the dosage of filtered ray reaching the affected deep part is further increased as many times as there are ports of entry. All of this makes it more than ever necessary to accurately measure and record the Roentgen dosage, and no man should be permitted to practice Roentgentherapy who is not equipped with the knowledge and instruments necessary to do this measurement of dosage.

In leukemia, deep Roentgentherapy finds one of its most valuable applications applied over the long bones in the myelogenous form and over the long bones and the enlarged lymphatic structures in the lymphatic form, its results show it to be a valuable symptomatic, though transitory, therapeutic means. Practically all cases relapse sooner or later; yet the prognosis is more favorable as to uniformity of symptomatic improvement and lengthening of life than with any other measure. The latter is true also of pseudo-leukemia, though here there is a ten or twenty per cent prospect of lasting cure.

In splenic anemia it should be possible to accomplish by the ray nearly all that splenectomy will do. If splenectomy is a cure for this form of anemia, then deep Roentgentherapy is indicated and should be given a thorough trial before operation is resorted to.

In Grave's disease, Roentgentherapy by our present refined, intensive methods gives results almost unbelievably good. Here the treatment is not merely symptomatic, but by the profound depression of the secretory function, has the character of an etiologic therapy, since it is aimed at the cause of a

disease whose essential pathologic feature is hyperactivity or aberration of the thyroid secretory function.

In enlargement of the thymus, Roentgenization is a well established therapeutic measure. The younger the patient, the quicker the results.

In gynecology, the chief indications for Roentgentherapy are the treatment of the climacteric and other known benign hemorrhages in women past 38, in whom it is necessary that the anatomical character of the endometrium be ascertained by microscopic examination of the curettings before Roentgentherapy is decided upon. Careful diagnosis is required to rule out unsuitable cases. The treatment deserves a much greater popularity.

Prostatic hypertrophy should also be amenable to deep, intensive irradiation in cases where operation is undesirable.

In skin and glandular tuberculosis, Roentgentherapy is an established method.

Pulmonary tuberculosis until recently has been considered beyond the reach of Roentgenization. Recent experimental and clinical results on the Roentgen treatment of pulmonary tuberculosis force us to reconsider our ideas on this subject. Kuepferle's results are very suggestive and hope-inspiring.

Roentgentherapy of Deep-Seated Malignant Lesions.

Dr. G. E. Pfahler, of Philadelphia, pointed out that the effect of the Roentgen rays upon malignant disease depends primarily upon the fact that malignant cells have less resistance than the healthy tissue cells. This has been shown by Dr. Pusey in demonstrating the results of superficial lesions, especially epitheliomata of the skin. All physicians, whether they use Roentgen rays or not, have seen epitheliomata of the skin fade away while the surrounding tissue remains healthy. The lesions melt down and disappear while the surrounding tissue suffers no damage. This shows very clearly that the malignant cells have a lowered vitality. The thing we need to do with Roentgentherapy in treating superficial lesions, is to carry a sufficient quantity of the rays into the deep-lying cells without damaging the superficial cells. The way that is done is, in the first place, by filtering the rays by means of which we remove the rays that are ordinarily absorbed by the skin. We absorb practically none that will go into the deep tissues. We do not lessen the deep effect by that process, but we do eliminate the superficial effect and thereby increase the quantity of rays that would otherwise be generated by the tube four or five or more times. He finds that if he filters the rays through three millimeters of aluminum and a layer of sole leather, which he is in the habit of doing now, he can give double the quantity that would otherwise be given. He can give 20 X or two full doses, so that he is getting from a single area of skin four or more times the quantities of rays which would reach the deep tissues if he used no filter.

The next point is the cross-fire method to which Dr. Case refers, and that depends upon passing the rays through different points of entrance through the tumor tissue from as many angles as practicable. He has used the cross-fire method from the beginning of his deep therapy work, dating back about fifteen years, so that deep Roentgentherapy is not the result of the last two or three years. He has been treating deep-seated lesions by Roentgentherapy for at least that length of time. The results are two or three hundred per cent better than they were three or four years ago, and should be when one stops to consider what is being done today that was not done at that time.

Dr. Pfahler showed the results obtained from deep Roentgentherapy ten to twelve years ago, although he said the technic at that time was crude and inefficient. We should expect to accomplish more today with the X-rays with the improved technic.

He takes the most desperate cases, and naturally has many failures, but as a rule

he helps every patient. Every patient gets some benefit. There is an increase in the length of life, an increase in comfort and in hopefulness, but he is getting increasingly good and permanent results.

The great majority of cases of deep-seated malignant lesions cannot be demonstrated on the screen, but he pointed out the actual and undisputed results from Roentgentherapy both in the treatment of sarcoma and carcinoma. He said it is difficult to demonstrate on the screen the results of the treatment of carcinoma of the uterus, or to show the results of the treatment in the form of metastatic carcinoma involving the soft tissues, and yet a great deal of his work involves exactly that class of cases.

He has had good results in carcinoma of the tonsil, carcinoma of the larynx, etc., by means of the X-rays.

Dr. Pfahler then showed a number of slides of patients before and after treatment.

Discussion.

Dr. P. M. Hickey, of Detroit, Michigan, stated that such excellent results as had been shown are obtained by paying careful attention to the details of technic. Technic is as important a factor in the treatment of malignant disease by Roentgentherapy as is the obtaining of diagnostic Roentgenograms. No one can expect to achieve results in diagnosis unless they acquire by painstaking study a proper technic. As Drs. Case and Pfahler had pointed out, the introduction of the newer methods as, for instance, the Coolidge tube, had improved the results to a remarkable degree, whereas formerly the Roentgenologist had only an inaccurate method of regulating his tube. With the advent of the Coolidge tube, the type of penetration and quantity of dosage have come down nearer to electrical measurements. With the approach of a technic which depends upon electrical measurements we certainly have better results.

Another point which he emphasized in connection with the matter of treatment is the necessity of the Roentgenologist having control of the patient through the co-operation of the physician who refers the case, so that the plan of campaign against the superficial or deep-seated lesion can be carried out properly without interference with suggestions that are based sometimes upon insufficient data.

Attention was called to the recent work published in the Johns Hopkins bulletin giving the excellent results which are being obtained by Dr. Halsted and Dr. Baetjer in the treatment of cases of hyperthyroidism, where patients have been operated upon and have not been relieved. They have found, according to the published results, and according to cases which the speaker recently saw during a visit to Baltimore, that by attacking the thymus in a certain percentage of them, with the six ports of entry, the results have been surprising to both Drs. Halsted and Baetjer.

Dr. Dunham, of Cincinnati, Ohio, emphasized the advisability of treating exophthalmic goiter by means of the Roentgen ray. There is no question but what treating the thymus is the secret of a great deal of the successful work that is now being done. Cases of exophthalmic goiter can be controlled without question by Roentgentherapy. He had had twenty-four consecutive cases of exophthalmic goiter that he has treated since 1903. The technic has changed in that time. The exophthalmos is not markedly affected, although very often it recedes considerably. The size of the tumor is not markedly affected, although he has known that to come down as much as one-third. The rapidity of the heart can be controlled by the X-ray, bringing the pulse down from 170 to 80 and 90, and holding it there right along. The thymus has something to do with treatment. The weight of these patients increases under Roentgentherapy, their disposition improves, and their appetite increases. Their general appearance is much better. The younger the patients are, the better the results. Blood pressure is lowered, but not in every case. There are doubtless cases which will not re-

spond to Roentgentherapy, but he has not had such a case.

He desired to make a preliminary report on the use of the X-ray in the treatment of carbuncle. Carbuncle can be controlled in one treatment by X-rays. It can be transformed from a hard indurated mass within a week's time to the effect of a boil, opened up, and allowed to drain like any other boil. It is unnecessary to burn carbuncles, to excise them, or to poultice them. He urged the members to try X-ray treatment in cases of carbuncle. He believes the X-ray is going to have a wider range in general treatment later on.

Dr. Case said that members of the profession should consider the advisability of resorting to X-rays in the treatment of cases of pernicious anemia, hypertrophy of the prostate, and perhaps pulmonary tuberculosis. We should by all means give the hyperthyroid cases a trial of Roentgentherapy.

Dr. Pfahler, in closing the discussion, stated that he was not recommending Roentgen treatment in all cases of malignant disease. Where malignant disease can be removed by surgery, it is the quickest and best method to adopt. All cases of malignant disease, particularly those in which there was a recurrence following operation, should receive the Roentgen ray treatment. If there is no disease or recurrence, there is no excuse for this treatment. If we give postoperative treatment, it is given on the supposition there are some cells left which the surgeon did not remove.

During the past four or five years in connection with his X-ray work he has been giving patients, especially those with carcinoma of the breast, small doses of thyroid extract, one-half grain doses, three times a day, and never going above one or two grains, three times a day. He feels that he has helped to improve his results by this addition.

Following Applications for Membership in the American Roentgen Ray Society Received by the Executive Committee

PAUL MORGAN STROTHER, age 31.
816 Church St., Lynchburg, Va.
Recommended by Alfred L. Gray, Daniel D. Talley.

CHARLES WESLEY STEWART, age 41.
Walker Bank Bldg., Utah, Utah.
Recommended by Albert Soiland, E. W. Caldwell.

JAMES N. MCCOY, age 40.
126½ N. 7th St., Vincennes, Ind.
Recommended by Arthur F. Holding, Lewis Gregory Cole.

PHILIP HOWARD COOK, age 35.
771 Main St., Worcester, Mass.
Recommended by Percy Brown, H. W. Van Allen.

EARL H. KING, age 37.
75 Caroline St., Saratoga Springs, N. Y.
Recommended by Thurman A. Hull, James P. Marsh.

GLADYS LYDIA CARR, age 33.
125 Ocean St., Lynn, Mass.
Recommended by A. W. George, Percy Brown.

ISAAC SEETH HIRSCH, age 33.
56 East 93rd St., New York.
Recommended by A. J. Quimby, J. T. Case.

ALBERT FRANKLIN TYLER, age 33.
507 City Nat'l Bank, Omaha, Nebraska.
Recommended by Fred C. Zapffe, E. H. Skinner.

FRED SUMMA O'HARA, age 38.
6th and Washington, Springfield, Ill.
Recommended by M. B. Titterington, Albert Soiland.

ISAAC GERBER, age 29.
259 Benefit St., Providence, R. I.
Recommended by Lewis Gregory Cole, A. W. George.

ANDREW EDWARD O'CONNELL, age 33.
Slater Bldg., Worcester, Mass.
Recommended by P. F. Butler, A. W. George.

CRUM EPLER, age 43.
104 Pope Block, Pueblo, Colo.
Recommended by Samuel B. Childs, E. Gard Edwards.

AUGUSTUS ROBERT TAFT, age 40.
105 Rutledge Ave., Charleston, S. C.
Recommended by Robert W. Gibbes, L. W. Cunningham.

ABSTRACTS

Davidson, Sir James MacKenzie, London: The principles and practice of the localization of foreign bodies by Roentgen rays. (British Medical Journal, January 2, 1915.)

For more precise localization in which exact measurements can be obtained, it becomes necessary, of course, to make certain special arrangements. If the maximum amount of accuracy and information is desired, the method which the writer devised and described seventeen years ago will meet the case. It depends upon the use of cross wires. Having decided what part of the body has to be examined, one places upon the skin of the patient as he lies on the couch a frame carrying thin cross wires at right angles to each other. One of these wires runs parallel to the length of the couch and the other to the breadth. The position of these wires is traced on the skin with nitrate of silver, so that the position they occupy leaves a permanent mark, then the distance of the anode to the plane of the cross wires is accurately ascertained and noted. This can be done with ordinary inspection by means of a foot-rule, one end of the foot-rule being placed on a level with the central point of the anode of the tube and the height of the cross wires above this point being read off. Sometimes it may be more convenient to fasten the wires on the patient's skin with plaster. The next procedure is to adjust the plumb-bob carefully so that it falls upon the intersection of the cross wires, and, as a further assistance, fuse wire in the shape of an arrow can be placed upon the wound of entrance, or a wire circle placed upon the wound of exit, or a similar indication upon any landmark one may wish to note. The plate is then laid upon the top of the cross wires and a photograph taken, care being taken in the meantime that the patient does not move in the slightest degree. The tube is displaced when dealing with the purely stereoscopic aspect of the subject, and the displacement is of the same extent—namely, 6 cm. from the former position, either along the couch or across the couch. It is advisable in the notes of the case to record in which direction the displacement was made.

When these photographs are developed, each of them shows white lines corresponding to the position of the wires. As these were closely in contact with the plate they suffer no displacement—that is, there is no effect of parallax—but all other objects, in accordance with their distance from the plate, do suffer more or less displacement. It should be pointed out, in the first place, that these negatives are stereoscopic, and when viewed stereoscopically they show the cross indicating the level of the skin, and all the other parts in their true relation to it. But, apart from this, it is very simple to ascertain by measurement the exact position of any foreign body or bodies, and also the size of the foreign body, the direction or angle in which it is lying in the tissues, and its distance from the skin, and from each cross wire, and from any other points which may be required.

The method of interpreting these negatives is as follows: A tracing paper, or tracing sheet of gelatine, has cross lines drawn upon it. One of these negatives is held up against a light source, and the tracing sheet is placed preferably upon the glass side of the negative, with the cross lines in accurate register with the white image of the cross lines on the negative. This position can be maintained with little pieces of rubber plaster while the bullet or other object is traced with pencil. A similar procedure, on the same tracing paper, is carried out with the other negative, and it is convenient to use black pencil for the tracings in one instance, and red pencil in the other. In this way one obtains on the tracing sheet a single cross with duplicate tracings of the

bullet, the outlines being displaced as between the two negatives, in accordance with the direction of previous displacement of the tube.

In order to enable measurements to be made by reconstructing geometrically the conditions of the exposure, an instrument devised by the writer, and called the cross-thread localizer, is employed. (The principles upon which it depends are illustrated in the accompanying diagrams, reproduced from the author's paper, published in the issue of the *British Medical Journal* for January 1, 1898.) The apparatus he now uses

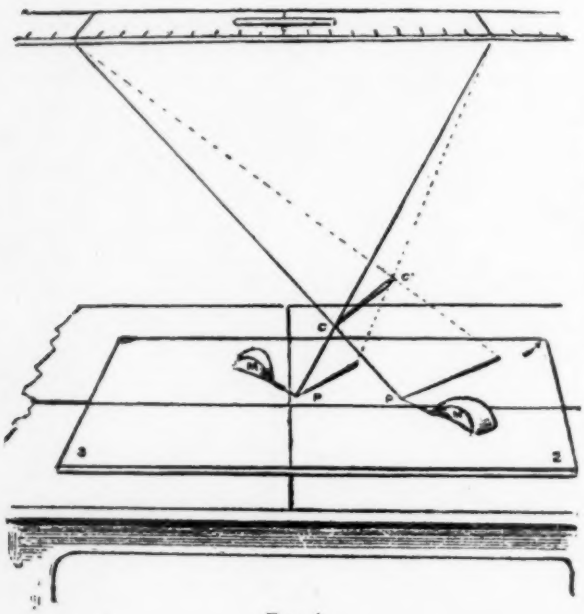


FIG. 1

consists of a small flat table surface, which again has the two black lines drawn upon it at right angles to each other. From the middle of one of the sides of this table there rises a sliding upright, with clamp, which can be used at any desired height. This is really a T-piece, and the arm reaches above the middle of the table. A central notch on this arm is adjusted so as to be exactly above the point where the two lines intersect below, and on either side, at distances of 3 cm. from this central notch, are two other notches, which in their distance from each other represent the distance of the tube displacement.

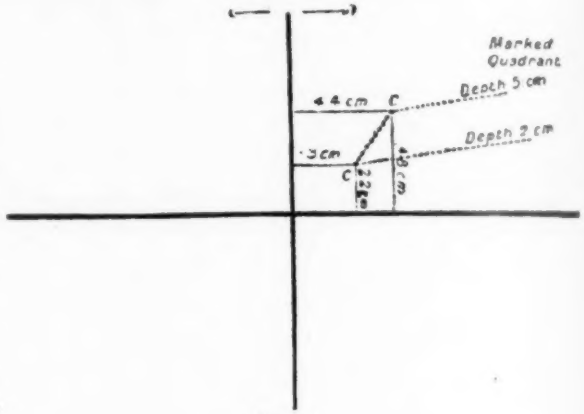


FIG. 2

The tracing is placed flat upon the table, with its cross lines in register with those already marked on the table, and the central notch of the T-piece is adjusted by means of a plumb-line to be exactly the same distance from the intersecting point below as was the anode of the tube from the center of the cross wires when the photographs were taken.

As Roentgen rays travel in straight lines from their point of origin to their destination, the path of any ray can be conveniently traced by means of a stretched thread. Accordingly two slightly weighted silk threads are passed in the little side notches on the T-piece, 6 cm. apart, and are attached to weighted needles on the stage below. In this way they can be used to trace any ray as desired. To take an example, one of the simplest cases is that of a round bullet, represented on the tracing paper by a couple of outlines side by side. It is evident that the outline to the left must have been produced by the tube when it occupied the right-hand position, and vice versa. The thread from the right notch, therefore, is brought down to a point on the tracing which represents the left-hand shadow, and the thread from the left notch to a corresponding point on the tracing which represents the right-hand shadow. It follows that the foreign body,

or the part of it thus indicated, must have occupied a position corresponding to some point along the line of these threads, and the actual position is immediately denoted by the point where the threads intersect. The distance from the tracing below to this point of intersection above furnishes us with the precise depth of the bullet below the skin.

The cross lines may now be looked upon as the bases of vertical planes, just as the lines marked out on a building site indicate the walls which presently will be laid upon them. A millimeter scale, attached to a base so that it can stand vertically, is brought into register with one of these cross lines, and by means of a pair of compasses the distance of the point of intersection of the threads from this vertical plane is measured. The same procedure is followed in the case of the vertical plane corresponding to the other cross line. Furnished with these distances of the two vertical planes from the point of intersection of the threads, one is enabled to measure on the skin of the patient, from the marks that have been left upon it, the distances from the planes at which the foreign body is situated, and once this point in relation to the planes represented by the cross wires is found on the surface, one knows that the bullet is situated at a distance vertically below this point corresponding exactly to the distance between the intersection of the threads and that of the cross lines marked on the table. An important precaution is to have some means of identifying one of the quadrants formed by the cross wires; this can be afforded by means of a mark made on the skin at the time of exposure, corresponding to the shadow of a fragment of lead on the plate. This precaution is necessary in order to avoid the possibility of mistaking the quadrant owing to the effect of reversal.

This method, while apparently elaborate, is simple, and gives the maximum amount of detail. A saving of time can be effected by making the two exposures on a single plate and thereby avoiding the tracing. Should a diagrammatic stereoscopic picture be desired when the two exposures have been taken on the one plate, it can be obtained by making a tracing of each image on separate pieces of glass or tracing material, and these, when combined by the stereoscopic method, give a faithful diagram of the relation of the foreign body to the cross wires. For cases where the screen is available a very speedy and simple method of ascertaining the position and depth of a foreign body is at hand. The patient lies on the couch, and is examined with the screen; the tube is moved until the plumb-bob is brought vertically above the shadow of the foreign body. This position is marked on the skin beneath, and also on the glass of the fluorescent screen. The tube is then displaced in any direction to a known distance, and then the distance the shadow has moved is measured and noted. The distance of the tube having been ascertained and noted, it becomes a matter of extreme simplicity to determine the exact depth of the bullet below the mark made on the skin. This is carried out by the well-known formula of similar triangles. If x be the distance of the foreign body beneath

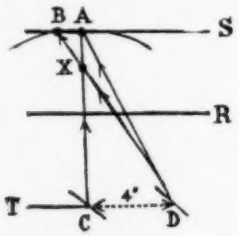
FIG. 3—A B, Distance of X-ray tube from screen or photographic p'ate; A C, distance between the two positions of the X-ray tube; D B, distance between two shadows of bullet; x, distance or depth below skin of the bullet. To ascertain x by similar triangles the formula is:

$$D\,B : x :: A\,C : (A\,B - x)$$
$$D\,B\,(A\,B - x) = A\,C \times x$$
$$X = \frac{D\,B}{A\,C}\,(A\,B - x)$$

the skin at the point marked, then as the displacement of the tube is to the height of the tube above the screen, minus x, so is the distance between the displaced shadow to x.

Overend, Walker, M. A., M. D.: Localization of bullets and shrapnel. (The Lancet, Nov. 28, 1914, page 1245.)

The methods described by Overend depend on the well-known fact of the displacement of the shadow when the target or anticathode is moved out of the direct line. In the figure x is a foreign body situated, for example, in the muscles of the back, the patient lying face downwards. The diaphragm, rectangular by preference, being contracted to a mere slit, the tube is moved until the shadow lies exactly central. The point of a pencil is placed on the center of the shadow if the object is irregular in shape; if a pointed bullet either on the apex or opposite end. The light is then turned up and the spot is marked on the glass of the screen with a small dot of ink or with a solid ink pencil. The diaphragm is now opened and the target (T) moved to D, four



inches to the right. The shadow is displaced to the point B; its position is again marked on the screen. As the distance of the target below the edge of the table is known, or may be ascertained once for all, it now only remains to measure the height of the screen (S) above the touch (R), when the distance of the anticathode from the screen or skin is found.

The data obtained are the amount of displacement of the shadow corresponding to a four-inch movement of the target and the distance of the shadow from the target. To facilitate matters, a four-inch steel rule may be purchased in which the inches are divided into 32 parts. For immediate calculation, a table may be consulted consisting of several columns. In the first column the depth of the body in inches is given, in the remainder the displacements of the shadow in 1/32nds of an inch, for 18, 20, up to 30 inches distance of the screen from the anode. The distance between the shadows is measured on the four-inch scale in 1/32nds of an inch, the column corresponding to the height of the screen is taken with the degree of displacement. This line is followed to the left to the first column and the depth of the object is ascertained.

Before commencing the localization, it is important to see that the tube itself is properly centered. This may be done by placing a circular metallic reel—such as is generally used for surgical plaster—on the couch and the fluorescent screen over it. The position of the tube is now altered in its box until the shadow of the reel corresponds to the reel itself. Before the patient leaves the couch, it is necessary to indicate on the skin as a landmark the position of the shadow cast by the direct ray. This may be done by moving a long, thin, pointed metallic rod beneath the screen until the shadow of the point corresponds with that of the foreign body. Indelible pencil or solid silver nitrate may be used. The whole procedure of localization need not occupy more than ten minutes.

If the shadow is too small, indefinite, or if very accurate estimation is required, two radiograms may be taken on the same plate with the anode in the two positions already described. The measurement is then made between identical points of the shadows in 1/32nds of an inch. The brighter and more definite shadow is that cast by the direct ray. This method may be employed for bullets within the chest, abdomen, large joints, and skull. If the shadow moves with respiration, the double radiogram must obviously be taken in the same phase each time.

Overend has advised a simple localizer which may be employed when the distance between the shadows has been ascertained.

It is clamped to the side of the couch directly the two shadows have been marked, and consists of a vertical rod, which carries in a sleeve a horizontal aluminum bar. At the extremity of the bar a pellet of shot is fixed. The bar is movable up and down on the vertical rod, also backwards and forwards in its sleeve. Fastened to the rod is an inch-scale and an indicator which at first is situated at zero. Before the patient leaves, the horizontal bar is projected over the screen, and lowered so as to touch it; then it is withdrawn and fixed. This position denotes the height of the screen. After the patient has gone, the screen is again placed at the same level and the pellet of shot is brought exactly beneath one of the shadows. The tube and diaphragm are adjusted until the central ray strikes this shadow; the diaphragm is opened, and the tube moved four inches in a direction opposite to the second shadow. The shadow of the shot does not change its position, since it is situated exactly at the screen. The scale is now fixed, and the shot with the bar slowly depressed. Its shadow moves towards the second; when it is at the same level the bar is clamped and the depth is read on the scale.

In the upper arm, thigh, and calf it is not always easy to find the bullet, even after crosses have been made at right angles to each other. The safest plan, perhaps, is to place the limb, with the assistance of the surgeon, in the *exact* position in which the operation will be performed, and localize the depth in the manner mentioned above, either by marking the two shadows on the screen or by taking a *double* radiogram. If the aperture of entry is near the shadow, a tiny piece of adhesive lead foil as an additional landmark may be placed over it, before the single or double radiogram is taken.

Oliver, John Chadwick, M. D., Cincinnati, Ohio: The element of certainty in diagnosis. (The Ohio State Medical Journal, vol. xi, No. 1, January 15, 1915.)

Every surgeon of experience will admit that the newer methods have wrought a revolution in the art of diagnosis, and that his functions have been curtailed to a very appreciable extent by the necessity for technical knowledge he does not possess and which he cannot be expected to acquire. A special corps of medical men has sprung up whose efforts are largely confined to the investigation of one or more methods of diagnosis. Roentgenologists, microscopists, chemists, cystoscopists, experts with the esophagoscope and bronchoscope, and others, vie with the surgeon in their efforts to solve the mysteries of disease. One must be a very wise physician who can master the many details of diagnostic methods.

One can truthfully say that the newest specialty in medicine is that of diagnosis. The physician and surgeon no longer rely upon themselves for anything more than a tentative or possible diagnosis. The real responsibility of making an exact diagnosis rests with those who are expert in obtaining and interpreting the visible evidences of trauma or disease.

The rise of the diagnostician has been rapid and the material for interpretation has been much varied in its nature. The field of skiagraphy has been extended so rapidly that even the best radiographer has not been able to keep pace with all the meanings conveyed by a skiagram. The revelations of the Roentgen ray have put to flight many of the ideas received from the dissecting and postmortem rooms. Our ideas of the positions of the hollow viscera of the abdomen in the living individual were derived from knowledge obtained from the cadaver, so we were quite nonplussed to find that we had very erroneous conceptions of the anatomy of the living. There still exists much doubt in the minds of many as to some of the revelations of the Roentgen ray when so-called pathological deviations of the intestines are shown. These deviations are so common as to constitute the rule instead of the exceptions, so we should be very cautious about accepting their interpretations until more knowledge is obtained.

The principal object in presenting this paper was to emphasize the necessity for cau-

tion in accepting without reservation the apparent story told by skiagrams, and by illustrative cases show how even the most expert roentgenologist may misinterpret the picture before him. We must always remember the fallibility of the interpreter, and add our clinical knowledge to his technical skill.

It is by no means an easy task to estimate the relative value of clinical findings and those of the Roentgen ray. In the vast majority of instances there is fortunately an agreement, but many cases present apparent contradictions, and it is the clinician who must harmonize apparent discrepancies by gathering all of the evidence and then reconciling the differences, because while the expert in a particular line of diagnosis may assume that a certain diagnosis is correct, the responsibility, moral and legal, for acting upon that belief must be assumed by the surgeon. Not only is this true, but unfortunately the knowledge of the diagnostician may be used to the detriment of the practitioner. Many of the malpractice suits brought against physicians have their origin in skiagrams taken after the case has been dismissed from treatment. This fact should lead every surgeon to utilize skiagrams in the diagnosis of every fracture, and in every case of injury in which a fracture *might* be present. The author has been impressed times without number with the indifference of the general practitioner to the value of skiagraphy in this class of cases. It seems remarkable how often we still find physicians treating fractures without obtaining the aid furnished by skiagrams. They seem to think that the older methods of "setting" the bone and then encasing it in a plaster-of-paris cast are all that is necessary. The failure to avail themselves of this exact method of diagnosis often results in a deformed limb, and sometimes in an ugly suit for malpractice.

The ideal conduct of a fracture demands a skiagram as soon as possible after the receipt of the injury, in order to ascertain the problem to be solved, another skiagram after it is supposed the correction has been made. One should not be content with his efforts until the skiagram shows a complete correction of the deformity. A final skiagram should be taken just before the case is dismissed from further treatment. By following this method one always knows the exact condition present, and is always master of the situation. Some physicians seem to fear exact knowledge and prefer to trust to luck and hope for good results. *Exact knowledge has nowhere proved of more value than in the diagnosis and treatment of fractures.* He believes it would pay the physicians of any community, however small, to establish and maintain a Roentgen ray machine and have one of their number learn to use it sufficiently well to get good pictures in fracture cases. Co-operation among physicians is just as necessary as united effort in any other field. It will not only organize the local profession, but will lead to improved results in treatment.

There was quite a discussion at the last meeting of the American Surgical Association concerning the comparative value of Roentgen ray plates in the diagnosis of diseases of the stomach and duodenum. One surgeon placed but little dependence upon the skiagrams, and then only when he himself interpreted the meaning of the plates—he placed the plates low down in the scale when compared with the other methods of diagnosis. The majority of the speakers were of the opinion that a skiagram required special knowledge for its proper preparation, and that the expert along this line ought to be able to render a much more valuable opinion than could he whose knowledge of skiagraphy was much less—as a necessary corollary they attributed a much higher value to the interpretation of the plate.

This brings us to an exceedingly important point in our discussion, *i. e.*, the fact that the value of a Roentgen ray plate is in direct ratio to the skill, knowledge and experience of the interpreter. The amateur in this work is an exceedingly dangerous adviser, because he may lead one far astray

from the truth by reason of his lack of knowledge; whereas the expert can help us along in obscure cases by means of his exact knowledge. It is, therefore, of the greatest importance that the roentgenologist be thoroughly grounded in his science, and that he possess medical knowledge sufficient to insure an intelligent interpretation of the pictures taken.

The author has been much impressed with some of the possibilities of error in abdominal work, in which bismuth is used for the purpose of outlining the intestinal canal. The fact that the intestines alone are outlined may lead us astray regarding the underlying conditions. An illustrative case is that of a woman who suffered with intestinal obstruction, in whom a tumor could be felt both by pelvic and abdominal examination. The skiagrams showed a distinct stricture of the sigmoid flexure and normal bowel above and below it. Had the skiagram alone been relied upon, one would have said without hesitation that the strictured portion could have been removed and an anastomosis performed. When the abdomen was opened, the pelvis was found to be so fully occupied by a malignant mass that an anastomosis was a physical impossibility. Reliance upon the skiagram alone would have led one far away from the true condition.

Another point of great importance is that we ought, in any given case, to exhaust all of the exact methods at our command before arriving at a final conclusion. This was well illustrated by a personal experience with a lady who, while convalescing from a breast operation, was suddenly seized with intense pain in her right side and back. Vomiting accompanied the attack, and there was elevation of temperature, following a chill. Excruciating pain was caused by pressure over the right kidney, and urine withdrawn by catheter showed blood in visible quantity. A skiagram taken a couple of days later revealed the presence of two calculi. After recovery from the breast operation, the patient returned to her home for several months and then returned for a second skiagram and operation. The two stones were still present. Exploration of the kidney was negative, but the stones were found in and removed from the gall-bladder. The failure to outline the pelvis of the kidney with collargol resulted in a mistaken diagnosis, even though the clinical symptoms pointed most certainly to the kidney as the seat of the trouble.

On the other hand, it sometimes happens that the skiagram will clear up a case which seems inexplicable from the clinical symptoms alone. Mr. E. was fifty-six years old when first seen by the author. He gave a history of attacks of severe paroxysmal pain in the left lumbar region ever since he was eight years of age. The symptoms were highly suggestive of nephritic colic, but repeated examinations of his urine were entirely negative. He passed through the hands of many physicians in the early years of his trouble, and was treated for many different complaints, but his trouble remained with him. About five years ago a skiagram revealed the presence of two stones in his left kidney, but his urine was, in repeated examinations, found to be normal. He drifted around from one physician to another. A skiagram in the author's office confirmed the presence of the calculi. The urine displayed no pathological deviation. That obtained by catheter from the left ureter was normal. The calculi were found and removed at operation.

Glegg, Wilfrid, M. D., Birmingham, and Black, Harold, M. B., Birmingham: A case of Roentgen ray diagnosis of a chronic cerebral abscess secondary to frontal sinus suppuration. (The Lancet, January 16, 1915, page 124, vol. clxxxviii.)

The patient was sent to the hospital on account of the persistence of discharge from a fistulous opening in the right frontal region, in the lower part of a depressed scar above the inner end of the right eyebrow. The history was as follows: In April, 1913, the patient attended the eye department with

symptoms of acute inflammation in the right frontal sinus. He complained of pain, and in the upper part of the right orbit there was an inflammatory swelling, which was incised. Carious bone was detected in the orbital roof, and through a necrotic area a probe could be passed into the right frontal sinus. The patient was sent to the surgical side, where a radical operation was performed on the right frontal sinus. The right frontal sinus was a shallow one. Its entire anterior wall was removed, and also the mucous lining of the sinus, in a state of polypoid degeneration, showing that the cavity had been the seat of chronic disease with a recent acute exacerbation. There was no sign of caries on the posterior wall. An opening was found through the median partition into the left frontal sinus. Drainage into the nose was attempted on the right side, and the edges of the wound were kept apart, but in spite of this the discharge continued externally from the lower part of the wound. At a subsequent operation, an area of carious and necrotic bone was found in the center of the posterior wall of the sinus, and by its removal the dura was exposed. Purulent discharge still continued from the wound.

In September, 1914, the patient was admitted to the hospital for further treatment. No evidence of disease was observed within the nasal cavities. After determining the upward and inward direction of the fistula, it was decided to make use of Beck's bismuth paste to demonstrate, if possible, the source of the discharge. For this purpose, a small amount of it was injected through the fistula and was retained for the most part. Radiograms then were made on two occasions in postero-anterior and lateral directions, and it was seen that the bismuth had collected in the right frontal lobe of the cerebrum. Under an anesthetic, a flap was raised along the lines of the former incision to expose the right frontal bone, where an opening was found about the size of a shilling, exposing the dura. The bone edges were smooth and the surrounding bone was healthy in appearance. The fistulous track from the lower part of the skin incision led to an opening in the dura surrounded by granulations at the upper edge of the hiatus in the bone, and sinus forceps inserted through it allowed about a dram of pus to escape.

The case illustrates the use of bismuth combined with a Roentgen ray examination in localizing the site of the abscess before operation, and its value as an aid to diagnosis of an otherwise obscure source of a purulent discharge.

Kempster, Christopher, London, England: Treatment of trichiasis by means of the Roentgen rays. (British Medical Journal, February 20, 1915, page 332.)

The treatment employed by Kempster consists of the epilation of the ingrowing cilia by means of the Roentgen rays. The technique of the operation is simple, but requires care, both with regard to the protection of the eye and surrounding parts from the rays, and also in the delivery of the proper quantity and quality of the rays, as an under-dosage will be labor in vain, and an over-dosage may lead to severe inflammation of the eyelid and subsequently to scarring and contraction of the tissues.

The method adopted was the close-range method, employed in cases of tinea tonsurans. The eyeball was rendered anesthetic by the introduction of a few drops of two per cent solution of cocaine hydrochloride. A thin sheet of lead, suitably shaped and long enough to protect the lower lid by overlapping it, was enclosed in an envelope of several layers of India-rubber tissue, sealed smoothly by chloroform and introduced beneath the upper eyelid.

The upper lid was then closed and held in position by a piece of adhesive plaster placed upon the skin of the upper lid and fastened securely to the cheek. A thick sheet of lead-rubber, having an aperture suitably cut in it, was placed over the face, so as to protect the eyebrow and face generally from the Roentgen rays, and fastened by strips of plaster. The tube was now brought into position, so

that the anti-cathode was 10.6 cm. from the skin of the upper lid. The exposure lasted five and a half minutes, the tube being of a medium hardness, such as is used for tinea tonsurans; the milliamperemeter registered 0.8. The pastille which was placed upon the lead-rubber protective sheet, and thus as near the irradiated skin surface as possible, showed a color corresponding to Tint 5 on Dr. Hampson's disc, the dose received being, therefore, somewhat under the 1¼ erythema dose of Sabouraud.

Kempster saw the patient at the end of two weeks, when some of the cilia were beginning to fall. There was no inflammation of the eyelid and she had not experienced any inconvenience. At the end of three weeks the cilia were falling freely and were quite loose in their follicles, and at the end of four weeks they had nearly all fallen; the remaining few, which only needed to be lifted from their sockets, were removed with forceps. The eyeball by this time was wonderfully improved in condition, the inflammation had gone, and the chronic watery appearance had ceased.

A second full dose of Roentgen rays was now administered with the same protective precautions as upon the first occasion; this also did not produce any inconvenient symptoms.

From time to time Kempster has removed one or two thin weak hairs which have appeared, but they came away quite easily and are now quite absent.

Bradbury, S., Plymouth, England: A simple method of localizing bullets. (Journal of the Royal Naval Medical Service, vol. 1, No. 1, January, 1915, page 40.)

After trying various methods of localizing bullets, the following has been adopted by Bradbury. The method is applicable to all cases, and does away with the necessity of rotating a badly injured limb through a right angle—an essential in his method—moreover, there are many positions in which the bullet may be situated where his method does not give the point on the skin nearest to the bullet. Fifty-four bullets have been localized, and in only two cases has there been the least difficulty in finding the bullet on the operating table. The part is screened, and the anticathode placed vertically underneath the foreign body. Two markers are placed on the part, one above and one below, in line with the bullet. These points are marked on the skin (A and B in Fig. 1). The part is rotated through a few degrees and the process repeated, the points C D being marked. A strip of sheet lead about ⅓ inch wide is now moulded to the limb, and the four points, A, B, C, D, marked on the lead. The lead strip is then removed from the body or limb, and its curve accurately traced, the four points being marked on paper. The points A and B, C and D,

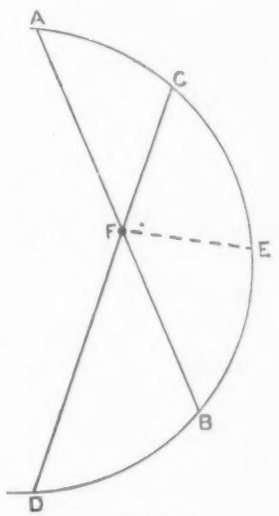


FIG. 1

are joined, and the intersection of these lines at F represents the position of the bullet. A line is drawn from F to the nearest point E of the curve, which is the point on the skin nearest to the bullet. The distance between E and F gives the depth at which the bullet is situated. The distance between B or C and E is measured, and the point corresponding to E is marked on the skin with silver nitrate.

The rotation of the part prior to making the second examination must be done

through only a few degrees, or otherwise it would be impossible to remove the lead strip without altering its curve.

In cases where the surgeon wishes to know the position of the bullet in relation to bone, either the stereoscopic or triangulation method is used in addition to the above.

Morgan, H. J., M. D., and Dachtler, H. W., Toledo, Ohio: Thymic asthma successfully treated by Roentgen rays. (Surg., Gyn. and Obst., December, 1914, p. 781.)

Morgan and Dachtler report two cases.

CASE 1.—Z. G., aged twenty weeks; has had colds and snuffles since early life, and two attacks of wheezing and strangling, cough and dyspnea, during the last month. Her voice is clear; during sleep the difficulty in breathing is less. When picked up or when exposed to cold, the difficulty is greater. She has difficulty in swallowing. Weight, 7¾ pounds. Having a suffocative attack; face blue; respiration, 90; marked inspiratory stridor, with slight cough. Nose, throat, eyes, and ears normal. Auscultation: Rattling, bleating and wheezing; fine and coarse mucous rales over whole chest, front and back. Breathing "resembles the noise of boiling water." While listening, breath sounds stop for a few seconds; then air is heard to enter. There is sinking in of suprasternal and substernal region on inspiration and simultaneous bulging of anterior fontanelle. Percussion over chest, normal. Heart action, 100; no abnormalities. Percussion over thymus shows right border two centimeters to right of sternal border at level of second rib. Left border at left sternal margin. Thymic dullness below merges into that of heart. These findings verified later by roentgenogram. Other physical findings negative.

DIAGNOSIS: Adenoids, enlarged bronchial glands, and other causes of laryngeal stenosis being excluded, a diagnosis of thymic asthma is made.

December 24, 1913, first treatment by exposure to Roentgen rays, after which she seemed more distressed and refused food, but improvement in breathing noticed the next day. December 26th, second treatment: After effect not so noticeable, but voice is feebler. December 27th, third treatment: No longer continuously cyanosed; breathing much easier. Suffocative attacks, which have occurred six to seven times in twenty-four hours, occurred only twice yesterday. This and preceding treatments given at a distance of twelve inches, through leather filter only—one Holzknecht unit each. December 28th, fourth treatment: One-half Holzknecht unit. Almost no asthma; suffocative attacks (slight) only when exposed to cold; almost complete aphonia. Examination shows incomplete apposition of vocal cords due to swelling. No paralysis. January 3, 1914, fifth treatment: One Holzknecht unit. No reaction; continued improvement. Respiration 30, clear and free, no cyanosis or dyspnea; no suffocative attack for four days. Aphonia still present. January 13th, sixth and last treatment: One-quarter Holzknecht unit. Practically no symptoms of former trouble; voice returning. January 20th: Roentgenogram shows absence of thymic hypertrophy. All symptoms of asthma have disappeared.

CASE 2—M. K., aged eighteen months. Well until four months old, when he had frequent colds, with wheezing inspiration, shortness of breath, and cyanosis. He has had several suffocative attacks, sometimes brought on by exposure to cold, sometimes by handling, and between times has remained cyanotic, with slight cough and always dyspnea. His breathing is always easier at night. He has slight difficulty in swallowing. The trouble has been attributed to adenoids, and their removal advised.

EXAMINATION: There is marked inspiratory stridor and slight cyanosis. He coughs a little and evinces considerable distress afterward. The chest bulges slightly above; there is inspiratory depression of epigastrium. Eyes, nose and ears normal. Small amount of adenoids present. Auscultation gives typical bubbling breath sounds slightly diminished on right side; rate, 40. He breathes through the nose with the

mouth shut. Percussion over chest normal; heart action, 90; no abnormalities. Percussion over thymus gives left border 2½ centimeters to left of sternal border at second rib, and extends downward and to the left to the third rib. Right border at right sternal margin. Thymic dullness below merges into that of heart. Findings verified by roentgenogram. Other physical findings negative. A diagnosis of thymic asthma was made.

January 11th: First treatment by Roentgen ray, and subsequent treatments on the 13th and 15th, at a distance of twelve inches, through leather filter only—one Holzknecht unit each. Last treatment given on the 19th—one-half Holzknecht unit. Improvement noted after the third treatment; and as all symptoms disappeared soon after the fourth treatment, the family declined to bring him for more exposures.

Roentgenogram taken May 1st, more than three months after treatments discontinued, shows absence of hypertrophy of the thymus. Child has remained free from symptoms.

Lippman, C. W., M. D., San Francisco, California: The duodenum: A Roentgen study. (Surg., Gyn. and Obst., December, 1914, p. 724.)

Pathological conditions in the duodenum known up to the present are: (1) The ptoses (Chilaiditi), and (2) the stenoses (Holzknecht), with the following roentgenographic syndrome:

(1) Filling of the duodenum above the seat of the stenosis so that the wall of the duodenum is sharply outlined. (2) Ineffectual or partly effectual peristalsis of the filled duodenum causing a change in the form of the organ, but no change in position of contents. (3) Retention above the stenosis. (4) Occurrence of paralytic dilatation above the stenosis.

Within the last two years eight or nine men, independently of each other, came upon the idea of filling the duodenum with bismuth through the duodenal tube. Lippman did this for about six months, but was unable to get uniformly good results because the bismuth flowed away through the duodenojejunal flexure, or, if it halted in the passage, rarely remained in sufficient quantity for any length of time, as the peristalsis soon carried it farther. Finally, with Holzknecht, he modified the conditions of work by the very simple expedient of putting his distinctor (or compressor) at some point along the duodenum, usually at the duodenojejunal flexure, which is located through its bismuth shadow, and not by following any preconceived anatomical idea. Moderate pressure with the "distinctor" is sufficient. Thus he dammed back the bismuth and secured a complete filling of the lower part of the duodenum and a lesser filling of the rest of the organ.

The Gross tube is introduced into the duodenum and bismuth water suspension injected. The duodenum is first observed without compression and then with compression in the neighborhood of the flexure duodenojejunalis. We see ordinarily a C-shaped sausage-like tube with a smooth-walled pars superior and a pars media and pars inferior marked by their Kerkringian folds. The latter give these parts their characteristic feathery appearance when the filling is partial. On more complete filling the lower part of the duodenum appears as a cogged or toothed tube merging into the less completely filled jejunum. The starting point of the large waved peristalsis of the duodenum is apparently just after the bulbus; the wave runs down the pars superior and pars media till it reaches the obstructing distinctor. At the same time the bismuth is forced up against the genu superius, but very little flows back into the pars superior. The peristalsis in the normal duodenum usually proceeds in regular waves, the time of a complete peristole varying in duration in the individual case from five and one-half to seven and one-half seconds. There is no apparent difference in the peristaltic period whether the olive is

in the duodenum or not. The exact time of individual waves is difficult to determine, as the beginning and end of the peristaltic movement are not very well defined. In pathological cases the peristalsis is much more irregular, the duodenum contracting rhythmically for a few wave periods, then frequently resting for minutes at a time, then perhaps showing a single wave of peristalsis.

When injecting barium in a solution of 0.5 per cent. HCl, peristalsis was never excited, and if peristalsis were present it often stopped. Lippman thought, therefore, that the excess of acid in pathologic cases might be one of the factors in the causation of this irregular peristalsis. He made further experiments on the exciting factors of duodenal peristalsis which he hopes to publish in a later communication. He often takes advantage of these facts by withdrawing the tube after a short period of compression, combined with the injection of 0.5 per cent. HCl, and observing the bulbus.

The advantages claimed for these methods of filling the duodenum, with compression at the duodenojejunal flexure, are: (1) More complete filling of the duodenum with the exception of the bulbus; (2) observation of the peristalsis and the mobility of the duodenum fluoroscopically; (3) more exact determination of the location of the tender points; (4) observation of niches and defects in the duodenal picture; (5) diagnosis and differentiation of duodenal adhesions or variants; (6) dislocation due to extraneous causes; e. g., pancreatic tumor.

Holding, Arthur F., M. D., New York: Ulcer and cancer of stomach and duodenum. (American Journal of the Medical Sciences, December, 1914, p. 966.)

The main object of Holding's paper is to describe the roentgenographic appearance of ulcerative lesions of the stomach, and to point out the differential diagnostic points between malignant and non-malignant processes. The differential diagnosis of gastric (and duodenal) ulcer and gastric cancer is well shown in the following classification:

		ROENTGEN CHARACTERISTICS.
GASTRIC ULCER (Including duodenal.)	ACUTE (Fig. 1.)	Small stabile defect in bismuth shadow. Associated with spasm.
	CHRONIC (Fig. 2.)	Larger stabile defect in bismuth shadow. Associated with cicatricial formation. Associated with stenosis. Associated with dilatation.
GASTRIC CANCER (Including duodenal.)	TRANSITIONAL (Fig. 3.)	From ulcer to cancer. Can only be differentiated from ulcer by microscopic examination.
	PAPILLARY (Fig. 4.)	Small defect in bismuth shadow similar to ulcer.
	MEDULLARY (Fig. 5.)	Commonest form of cancer, lesion large and easily diagnosed by Roentgen examination.
	SCIRRHUS (Fig. 6.)	Fixed, contracted stomach, lesion easily diagnosed.

	ULCER.	CANCER.
VISUALIZATION.	Small and recent, may be overlooked on screen.	Much more easily recognized on screen.
PAIN.	Sharply localized pain-point, which moves synchronously with respiration and has direct and constant relation to defect in bismuth shadow. Presents early.	Pain diffuse, if any, and apt to present late.
ESOPHAGUS.	No retention in esophagus, showing that walls of cardia are pliable.	Frequent retention in esophagus, showing that walls of cardia are stiffened and not pliable.
MULTIPLE CONTOURS.	Not present in ulcer.	Scalloped contours. Finger-print contours. Conical contours. Superimposing test. } Significant.
HOUR-GLASS.	Sacculated form of hour-glass. Sulcus band-like. Segments equal. Spasm. Cicatrix.	Funnel-like form of hour-glass. (Fig. 5.) Segments unequal. No spasm. All deformity represents lesion.
PYLORIC STENOSIS.	Often causes pyloric stenosis, accompanied by hyperperistalsis and later dilatation.	May or may not cause stenosis and residue, according to location and character. If at pylorus, neoplasm is apt to break down, become tunneled and infiltrate in the walls, so as to open the pylorus. Carcinoma of the lesser curvature frequently presents so advanced as to be inoperable without affecting the pyloric outlet.
RESIDUE.	Ulcer often causes pylorospasm and six-hour retention because of hyperacidity.	Cancer seldom causes pylorospasm and retention because of anacidity.
PARASECRETION.	Zone of parasecretion between magenblase and bismuth shadow, showing hyperacidity.	Zone of parasecretion not shown because of anacidity.

	ULCER.	CANCER.
Size of Bismuth Shadow of Stomach.	Acute ulcer: Bismuth shadow diminished — (minus), due to spasm and defect in contour. Chronic ulcer with stenosis and dilatation: Bismuth shadow increased + (plus).	Bismuth shadow usually diminished — (minus), or shows a marked filling defect.
Peristalsis.	Hyperperistalsis if pylorus is involved.	Diminished or absent peristalsis, on account of fixation.
Retroperistalsis.	Retroperistalsis may present.	Seldom seen.
Height of Stomach.	Stomach usually not so high.	Stomach usually high in epigastrium.
Persistent Bismuth Speck.	Hemmeter's persistent bismuth shadow characteristic when seen. Presents only rarely.	Hemmeter's persistent bismuth shadow may present.
"Nischen Symptom."	Haudek's "nischen symptom" characteristic of a pocket when seen. Presents rarely.	Haudek's "nischen symptoms" may be present, though rarely.